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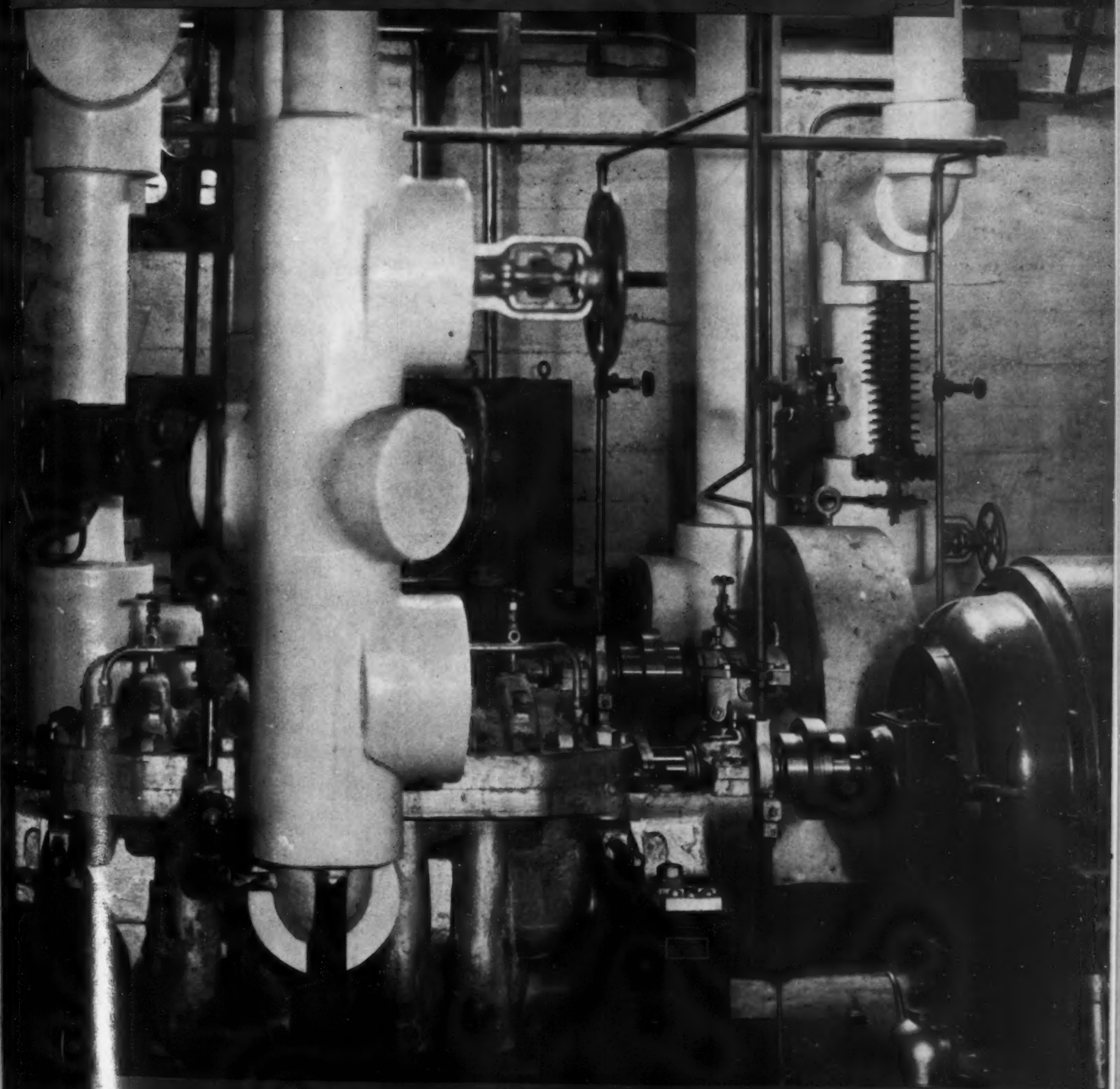
Electrical World

OCTOBER 17, 1942



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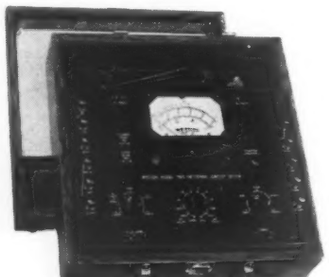

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A highly versatile tester for trouble shooting. Provides voltage, current and resistance ranges for checking motor and control circuits, lighting circuits, sensitive relay circuits, electronic circuits, etc. (D-C sensitivity 20,000 ohms per volt.)

Industry's production figures bear testimony to the outstanding contribution electrical contractors and plant maintenance men are making to war-plant efficiency. Despite obstacles such as materials scarcities and limited manpower, electrical equipment—old and new—is being kept constantly fit for full scale output.

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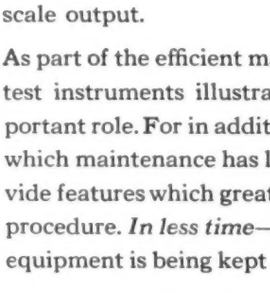

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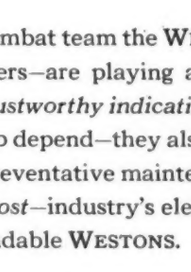

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Electrical World

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October 17, 1942

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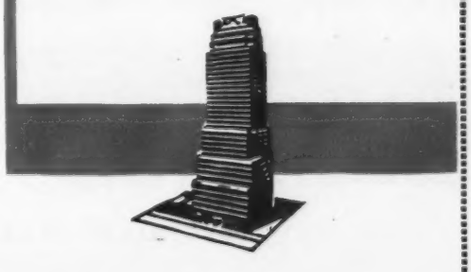

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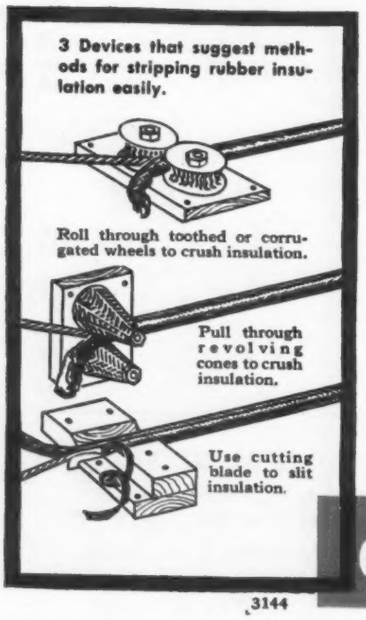
DON'T!

that Rubber Scrap is Priceless!


3 Devices that suggest methods for stripping rubber insulation easily.
Roll through toothed or corrugated wheels to crush insulation.
Pull through revolving cones to crush insulation.
Use cutting blade to slit insulation.

3144

The rubber insulation of wire and cable is even more valuable today than the copper conductor, scarce as copper is! Saving vital copper is absolutely necessary, of course, but the rubber in wire and cable insulation is priceless. The rubber shortage is so acute that immediate corrective measures in both military and civilian life have become necessary. So get into the scrap and salvage both copper *and* rubber.

Okonite cords, cables and insulations have extra years of service built into them. Get these extra years of service by using every precaution for their protection and longevity.* But, if they can no longer be used, *strip* off the rubber insulation and sell it to a licensed rubber dealer and sell the copper conductor to a metal dealer.

The scrap you save here and now may later become the difference between victory and defeat on some far-flung battlefield.

*If you have not already received a copy of the booklet "Do's, Don'ts and How's For Longer Life of Your Insulated Wires and Cables" write for a copy today.

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Salvage Your Scrap — Buy U. S. War Bonds

The Chemical Engineer cuts years to months...

Born in the turmoil of the last war, he is shaping a new world with mighty swords and magic plowshares

GERMAN CONSUL-GENERAL HOSSENFELDER, writing from New York on March 3rd, 1916, to von Bethmann-Hollweg, chancellor of the Imperial German Government, confidently predicted defeat for the United States because we were totally dependent upon the great chemical industry of Germany. "Americans," he wrote, "can never establish such an industry. They have the resources but they lack the necessary science and technology. And, besides, the conflicting selfishness of American business renders it impossible."

Even before the ink was dry on Hossenfelder's letter a new figure appeared on the industrial scene—the American chemical engineer. With the help of patient, but progressive and venturesome capital, he laid the foundations for the largest and most resourceful chemical industry in the world.

Today he is an all-important figure. For we are fighting a chemical war, even though the emphasis that is placed on planes, tanks, ships, guns and other armament tends to obscure that fact. And this chemical engineer is waging war for us on a prodigious scale. Bombers carry more tons of more deadly explosives because he has developed stronger and lighter alloys and more efficient fuels. Tanks are better armored and wield heavier blows because of products and processes born in chemical laboratories. Ships are welded together by new metallurgical techniques that save precious months over older processes. Gun barrels that are made in minutes instead of hours shoot farther and faster because of better ammunition.

And quantity keeps pace with quality. By mid-year of 1942, explosives were being produced in newly constructed plants twelve times faster than a year ago. Smokeless powder output has been doubled since December. Five times as much TNT was being made in July as in the months preceding Pearl Harbor. One single new plant produces more of this high explosive than did the entire pre-war industry—and several of these plants already are in production.

By what Major General William N. Porter, Chief of the Chemical Warfare Service, calls a "miracle of production," the sort of incendiary bombs that General Doolittle's lads showered on Tokyo were rolling out of our plants within a few weeks after we got into the war. As General Porter puts it, "they were rolling not by hundreds or even thousands, but by the millions." That record he has cited as a tribute to the "ingenuity, industriousness and patriotism" of the American chemical industries.

Yet the General agrees that we have only started to produce in the tremendous volumes that will shortly make Germany, Italy and Japan "revolve on their boasted Axis." Our newest plants are just coming into production. They face no limiting shortages of materials for, in the main, our chemical industry draws its strength from coal, salt, sulphur, limestone, oil, natural gas, coal-tar, air and water—all available in abundance.

We have heard little about the use of poison gas by our enemies. It may be that good reasons for this are stored away in our well-stocked chemical arsenals. American chemical manufacturers have worked hard and long with our armed forces so that if the time ever comes to make good on the President's warning of retaliation, America will be more than ready.

And defense against gas has not been overlooked. Every soldier is equipped with a most efficient type of gas mask, developed through twenty-five years of intensive research. The Chemical Warfare Service already is manufacturing millions of masks for distribution to civilians. Let us hope we may never have to use them. But if we must, we need have little fear of any gas or secret chemical.

This gas mask program has been made possible by a literal metamorphosis of production facilities, as peacetime industries have been converted to war purposes. A lumber company, for example, is making activated carbon from sawdust. Novelty manufacturers of rubber goods are turning out valves and assembling other parts. Former manufacturers of shirts, swim-suits, shoes and beds have converted their facilities and are contributing their share. More than eleven hundred contractors and two hundred and fifty sub-contractors are supplying their full quotas of chemical warfare materials. And production is right up to schedule.

But the bulk of the war job of our chemical industries has to do with items other than weapons and

ammunition. The German Consul-General, in that 1916 report to Berlin, said that many American industries were in a critical condition because of the scarcity of German chemicals. He related in particular that "the cries for help from the world of physicians are becoming louder and louder and more and more insistent." Thanks to our chemical industries this cry no longer is heard. Even though we are again cut off from quinine, camphor and some other strategic medicinals, our homes and hospitals are adequately supplied with synthetic products. Most of these are better and cheaper than the natural materials. The same sulfa drugs that have saved so many civilian lives in recent years have gone to war, with the result that deaths from infection at Pearl Harbor and Bataan are reported as surprisingly low. In this war we suffer no shortages of iodine and potash. Pioneering research in the field of vitamins has led to new industries that are contributing to health and better nutrition.

Those new uniforms the soldiers are wearing are of better quality and will last longer than the shoddy, ill-fitting outfits of 1918—thanks to sunfast dyes and new man-made products. And in the field of fabrics, nylon and the new rayons have gone to war in parachutes and super-strong cords for tank treads and tires.

* * * * *

And that brings up the question that 30,000,000 American motorists are asking with ever increasing concern. "When, Mr. Chemical Engineer, are you going to give us a set of new tires for the old family bus?"

That, I am told, is just what the chemical engineers have set about to do on a scale that is difficult to comprehend. In the words of Raymond Clapper, the columnist, "the synthetic rubber program for this year and the next is the biggest job of chemical engineering ever undertaken in the world." A billion dollar industry is being built at record speed to make almost a million tons a year of chemical rubber to serve our war needs and those of our allies. This cannot be accomplished overnight. Many months are required to design and fabricate complex equipment, much of which must be made from corrosion-resisting metals and alloys. We shall be lucky if a tenth of the desired capacity is in continuous production this year and even more lucky if, by the end of next year, the new industry should be turning out synthetic rubber at a rate of 875,000 tons—using both petroleum and grain as raw materials.

All this, of course, must go for essential military uses but there is reason to believe that in the laboratory and pilot-plant stages we have some promising substitutes and stop-gap materials that may tide us over until the big program starts rolling.

The present prospect of real success is possible only because of the cooperation of the chemical, rubber and petroleum industries. Individual firms and entire industries have set aside their normal desires and selfish interests to pool their patents, share their research and engineering developments for the common good. Synthetic rubber is here to stay as the basis for a great post-war industry: no doubt as to that lingers in the minds of the men who have seen many other natural products—indigo, alizarine, camphor, vanillin—all eventually fall before the ingenuity of the chemical industry.

* * * * *

In the coming peace to which we look forward hopefully, we shall find a new world full of new materials, new conveniences, new jobs, new opportunities, all stemming out of the present-day work of the chemical engineer. The same tough, transparent plastics that now make noses for bombers will give us new frameless windows for our homes and automobiles. With capacity to produce at least 2½ billion pounds of aluminum, which is five or six times pre-war production, and a magnesium capacity 50 or 60 times the pre-war figure, many new uses will develop for these structural materials of great strength and amazing lightness. Almost anything that flies, runs, moves, or otherwise is motive, will have a place for them. New fibers such as nylon and vinyon had scarcely got started before they were put to war use. Once the war is over they will be with us in greater abundance and at lower cost for a variety of uses so vast and so diverse that we can scarcely imagine them.

And the chemical engineer continues to create and to invent. He meets the challenge of scarcities and shortages with ever new "substitutes" that excel their originals. Even before the war is over he will have placed at our command a hundred new materials which we did not have before. His workshop is all industry. His contributions are as limitless as are our needs.

But right now his all-important job is to help win the war; to fight to a finish the ruthless and resourceful enemies that are devoting all their science and technology to bring about our defeat. So, as we take stock of our assets in this desperate struggle, we count among the first the proved resourcefulness of the research-minded chemical engineers we now have mobilized to help us fight this chemical war.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the fourth of a series of editorials appearing monthly in all McGraw-Hill publications reaching more than one and one-half million readers.

The Forgotten Birthday

A month ago the central station industry passed its sixtieth anniversary—unnoticed. With man 60 years is the beginning of the fourth score, the end of which few reach, but the central station industry is young, with a great future ahead of it, so that the start of each new decade should be an occasion.

Birthdays should be celebrated joyously so long as each new year is not the end of something, but the beginning of new opportunity. It is only when anniversaries remind us of the past when we were strong and vigorous and did things worth while, when the recollections of past glories are sweeter to the taste than the dreams of the future that we admit we can no longer contribute to human progress.

So in taking this late notice of the sixtieth anniversary of the birth of central station electric service let us not look back on the distance we have come as an industry or the contributions we have made to human progress, great as they have been, but rather let us with all of youth's expectancy and eagerness plan our part in the future.

There will be some who will not be able to refrain from looking back. They will see members of the family who have departed or married into religions distasteful to the family and will fearfully wonder who is to be next. For those who thus look back there is no future.

The central station industry isn't near the end, rather is it just starting on its era of greatest service to mankind. It is true that ownership is showing some change and that more can be expected. But if private enterprise ever had anything to offer, it is now, when times are changing and flexible, and alert minds are needed to steer us past the shoals of fascism.

There is the suggestion that when the war is over the surplus of power capacity will be staggering. We say no. If there is a surplus it will be but a challenge, the same as a decade ago, to our enterprise. Man can consume so much food, but unless man's inventive mind stops there can never be any limitation for long to his ability to consume electricity.

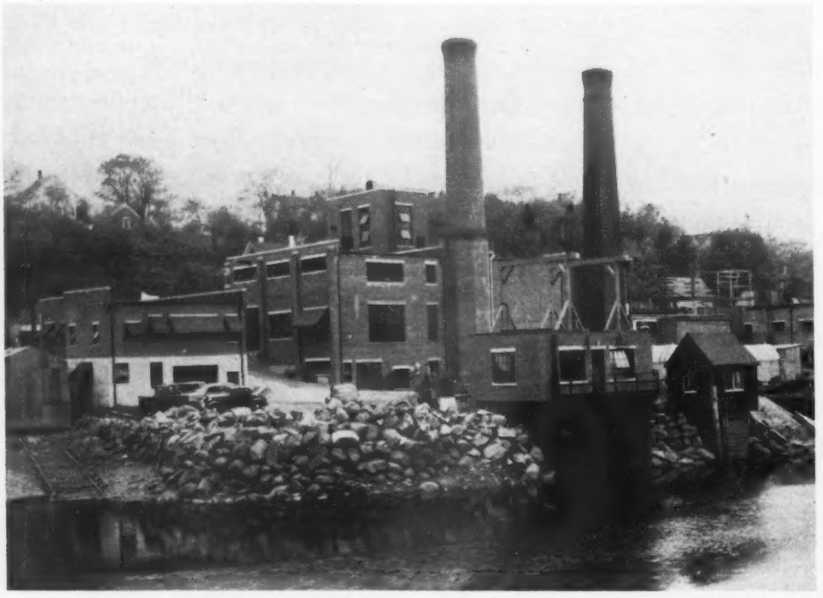
But does the future not hold out something other than selfish benefits? Does it not hold out the opportunity to extend service beyond present economic boundaries? Is there not some way in which utilities can contribute to the better post-war living of mankind?

How can methods or kind of service be changed so that the cost of doing business will be lowered and the rates further reduced? How can we work with labor that there may be less suspicion and more realization of mutuality of interest? If different races and creeds can live together with tolerance, why can't public and private ownership work together without constantly being at each other's throats? How can the utility industry work out common objectives for greater public service under recognized leaders? What can be done to inspire confidence and respect each in the other members of the industry? What can we do individually and, what is more important, collectively, to give employment to more people, to lower the cost of goods and service, to make people healthier and happier?

At this sixtieth anniversary of the utility industry does not the future's challenge inspire us more than any wistful contemplation of the past?

Modernizing a Small Utility Steam Plant

New unit for base-load operation improves station economy and reliability — Topping unjustified — Condensing and electrical layouts provide flexible service



PLANT EXTERIOR with departmental office building at left, extension housing new turbine unit in center and new circulating water pump house in foreground

INDUSTRIAL DEMANDS upon the steam plant of the Braintree (Mass.) municipal lighting department following the outbreak of hostilities in Europe required analysis of the capacity of the existing equipment to meet increased loads with reliability and economy, consideration of the value of a tie line already connecting the plant with a neighboring utility and the advantages of removing certain old apparatus and installing a new unit of relatively large size for base-load operation. The result was the installation of a 7,500-kw., 400-psi. G. E. turbo-generator, new condensing facilities, boiler feed pumps, deaerating heater, 30,000-gal. fuel oil tank and associated electrical improvements at a total cost of about $400,000, or about $54 per kilowatt, and an over-all economy of 15,500 B.t.u. per kilowatt-hour for the plant as a whole.

The station site, on a tidal stream, was limited by being relatively long and narrow, the location of the plant being between the river and a bordering thoroughfare. Because of this the improvements that were made were designed to take as much advantage as possible of vertical space rather than width.

In order to reduce purchase of energy to the minimum and save fuel per unit of plant output, a base-load turbine was provided. Older equipment was removed to make way for more modern apparatus, and along with striking improvements in condensing water supply the electrical facilities were made more flexible. The development shows what can be done to improve a small generating station under the conditions outlined below to achieve satisfactory operation at a moderate capital cost and reasonably high economy on a year-round basis.

Load and Equipment Available

Before the improvements were made, the Braintree station contained three 200-psi. and two 450-psi. boilers. Two were of 1921 vintage; one went in in 1924, one in 1932 (55,000 lb. per hour) and the latest in 1938. There were three turbo-generators with the following ratings and installation dates: 625 kva. (1916); 2,500 kva. (1924), and 4,375 kva. (1934). These units generated energy at 2,400 volts, 60 cycles, and the generator bus was tied by two transformer banks aggregating 4,000 kva. into a 13.8-kv. bus, from which various feeders served important industrial loads and into which was connected the tie line between the Braintree station and the near-by power company's system.

Onset of the present war in Europe did not at first greatly affect loads on the Braintree system, which serves a suburban town near Boston having a population of about 18,000 and several diversified industries. The old 625-kva., 200-psi. turbo-generator was removed about two years ago to

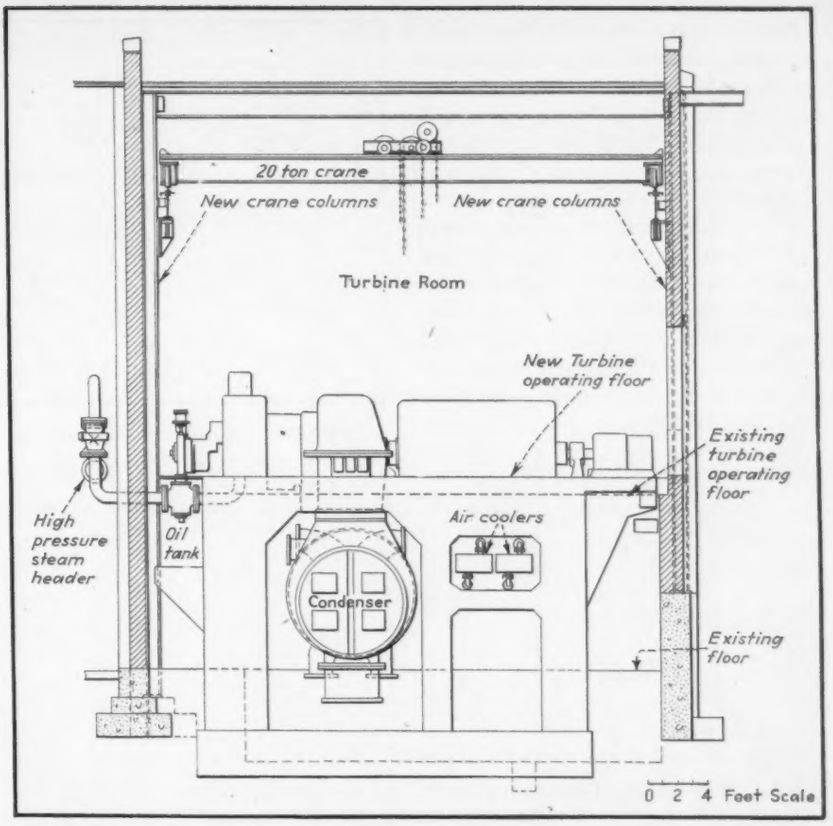
release space useful for future purposes, its small capacity and diminishing value as a plant component justifying this change. The 1940 peak load on the station was 5,200 kw. (December 17) and the system peak, which included purchased energy, was 6,100 kw. By the close of 1941 the station peak had risen to 6,500 kw., a 25 percent increase, occurring on December 23, at which time no energy was being purchased.

The two oldest boilers, both 200-psi. units, were removed last year to make room for two future boilers, thus leaving one 200-psi. and two 450-psi. boilers in the station.

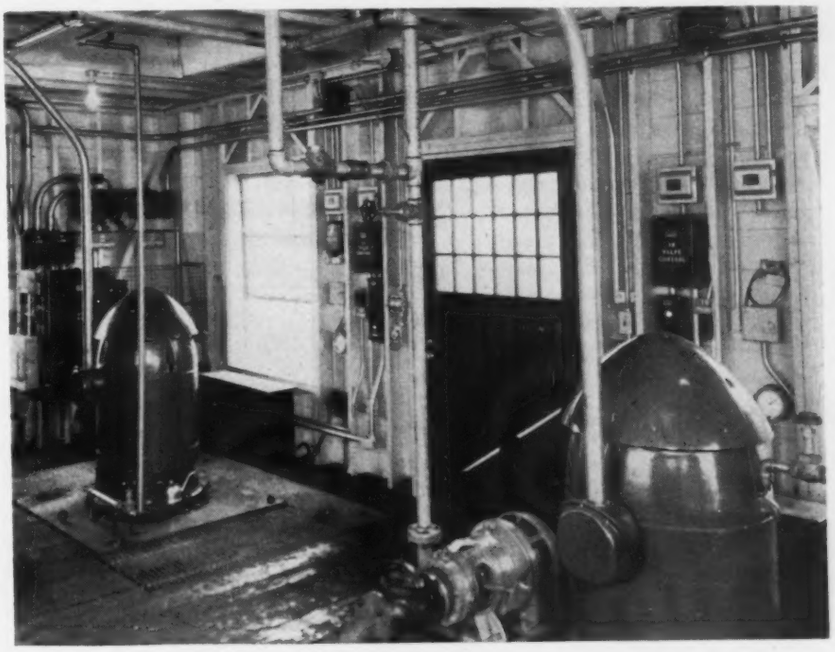
Topping Unjustified

Rating of the two remaining turbo-generators was 6,875 kva., but one was a 200-psi. machine (2,500 kva.) and primarily desirable for peak-load operation. In order to obtain a satisfactory base-load unit for the conditions, it was decided to purchase a 10,700-kva. (7,500-kw.) General Electric turbo-generator which would operate on 450 psi. from the two newer boilers, holding the 4,375-kva., 450-psi. machine ordinarily in reserve for non-base load use. The new machine was designed for 13.8-kv. operation in order to feed energy directly into the high bus. The 7,500-kw. rating was found desirable in relation to the existing and prospective loads, and as sufficient steam capacity existed in the two 450-psi. boilers, it was advisable to utilize these in connection with the new unit rather than to incur the expense of installing additional boiler capacity for higher pressure service. The capacity of the 4,375-kva. turbo-generator was too small to justify a topping turbine and boiler installation, and the cost of another boiler and auxiliaries for higher pressure operation would probably have increased the outlay for plant betterments by $200,000 or more. The 7,500-kw. rating was a logical one for the load and plant conditions, as this machine alone would insure a margin of approximately 15.4 per cent in excess of the 1941 peak. The existing boilers would provide sufficient steam, the 1938 unit being a B & W integral furnace boiler with a generating capacity of 90,000 lb. per hour.

With the new 7,500-kw. machine on base load, the two older units are retained for standby use, or future peak service. When operated from the 200-psi. boiler the 2,500-kva. machine will deliver about 1,600 kw., but if it is run from the 450-psi. main through a reducing valve about 2,000 kw. can be obtained from it. In order to maintain as flexible operation as feasible, there are two turbo-



CROSS-SECTION of turbine room, showing raised roof and new traveling crane to handle new generating unit in limited space



INTERIOR of circulating pump house, showing circulating pump motors and salt water flush pump. All condenser system valves for the new unit are motor-driven, with push-button controls in power and pump houses

generators available for 450-psi. service and one available for 200-psi. use with boilers suited to each pressure, a reducing valve tie-in between mains, and suitable transformer tie-ins between the 2,400- and 13,800-volt buses.

As modernized, the plant has a turbo-generator rating of 13,000 kw. and, with 3,200 kw. provided for in the interconnection contract with the adjoining utility, a total capacity of 16,200 kw. This gives a margin of 9,700 kw. above the 1941 peak. With the largest machine out of service, the combined plant and tie capacity is 8,700 kw., or a margin of 2,200 kw., or 34 percent, above last year's maximum load. Under normal conditions the base-load machine suffices for the entire service, requiring no purchase of energy.

New Equipment Economical

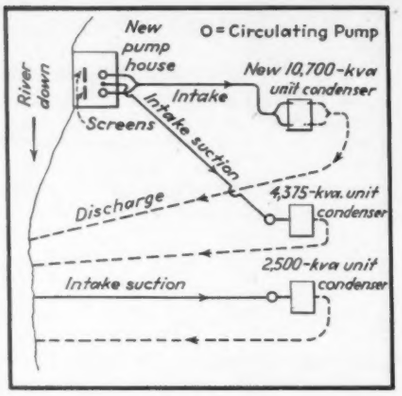
The new turbo-generator unit is a 70 percent power-factor machine running 3,600 r.p.m., taking steam at 640 deg. F. and exhausting into a 10,000-sq.ft. Westinghouse dual box surface condenser below. The water rate of this machine when running on a 29-in. vacuum is about 12 lb. and its B.t.u. rate 13,200 per kilowatt-hour. This is most advantageous in comparison with the economy of the older turbo-generators, 13,700 B.t.u. for the 3,500-kw. machine and 18,300 B.t.u. for the 2,000-kw. unit. In order to enable the new machine to be run at a good load with one water box out of service for cleaning or otherwise, the condenser was built with about 67 percent larger surface than normal. On base load the new machine delivers about 10 kw.-hr. per gallon of bunker C fuel oil.

Fuel oil is trucked to the storage tanks at the plant from a near-by major depot and tank farm. The total fuel oil storage capacity at the plant is 150,000 gal. There are no rail facilities at the plant and its proximity to the tank farm is a marked advantage, since conversion to coal burning would be costly and difficult under the circumstances of plant and equipment layout.

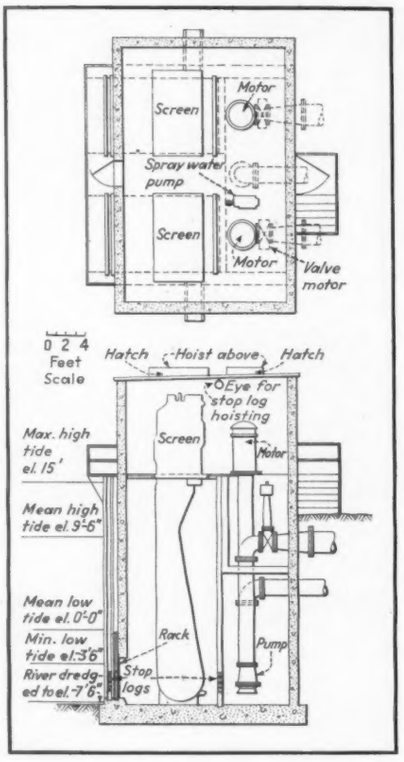
Roof Raised

The new turbine unit was installed in an unoccupied space in the station beyond the boiler house, leaving the earlier units on the opposite side of the boiler house with a switchboard and control center. In order to house the unit and provide space for a new and larger traveling crane of 20 tons capacity it was necessary to raise the roof of the newer turbine room to clear the operating machinery by about 20 ft. This was done without interrupting service. The crane rails were located close to the wall, with new supporting columns. With some alterations in floor level, the turbo-generator, including a direct-driven outboard exciter, was housed with a clearance of about 12 in. from the station wall.

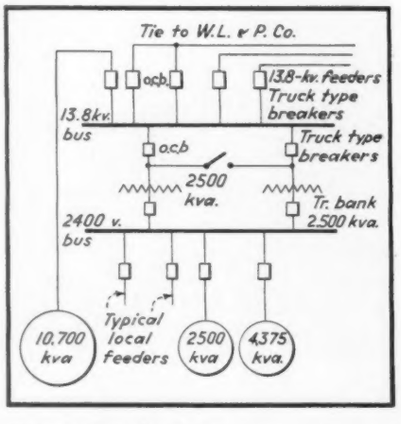
On account of the limited space available within the station it was necessary to run the generator leads and field control wiring from the new unit to the switchboard beyond the boiler house in ducts laid underground outside the plant. An open well was provided in the turbine room for housing the condenser and various auxiliary equipment which can readily be handled by the crane from above.



SCHEMATIC DIAGRAM (not to scale) of improved condensing water supply



PLAN AND ELEVATION of new circulating pump house



SINGLE-LINE DIAGRAM of generator and bus layout

For Heat Balance

The heat balance in the extension provided no unusual problems, but involved the provision of two new Ingersoll Rand 150-hp., six-stage, 260-g.p.m. centrifugal feed pumps adjoining the boiler room, a 130,000-lb.-per-hour Elliott closed feedwater heater, and on the roof an Elliott deaerator of that capacity which provides a 45-ft. head for delivery of water to the feed pumps. Two 20-hp. motor-driven condensate pumps were provided, and to continue the heat balance arrangements and flexibility of the plant one feed pump was made motor-driven and the other turbine-driven.

Despite the fact that the new unit and older turbines are located in rooms on opposite sides of the boiler house, the deaerator in a pent house on the plant roof, and with a new circulating pump installation in a house beside the river, no additional attendance is required to operate the station under its increased capacity. Two men per shift maintain the service here.

A factor in this is the use of an Edwards annunciator alarm system of twelve stations, which notifies the turbine and switchboard operators in case of changes in water, steam and air conditions requiring attention. These include stoppage of air com-

pressor, circulating water or condensate pumps, loss of vacuum, high or low feedwater, high or low steam pressure.

Swartout control of second stage bleeding from the turbine to the deaerator is also provided.

Space in the power house is saved by a new installation for circulating water supply which primarily cares for the new unit, but which also has a connection to the 3,500-kw. machine. The pump house has a brick superstructure framed with Douglas fir and an intake well below. For strength, concrete retaining walls and sides faced with creosoted short leaf yellow pine to prevent corrosion by sea water were provided. Sectional maintenance is facilitated by stop logs on the river front, and all hardware was galvanized. The pump house timber was fabricated and sawed to dimensions at the site, doing away with facing the substructure walls with granite.

Vacuum Held

Two 65-hp., 2,300-volt, motor-driven Westinghouse vertical impeller type circulating pumps with a combined capacity of 11,400 g.p.m. serve the new unit. With both pumps and the full condenser in use, inlet water at 50 deg. F. and 90,000 lb. of steam per hour being condensed, the vacuum was 29.08 in. When one circulating pump was out, under the above conditions, the loss of vacuum was only 0.32 in. Motors are at the pump house operating floor level for flood protection at a distance of 23.5 ft. above the intake.

To insure a clean water supply, the pump house is equipped with two Link Belt revolving screens, each driven by a 3-hp., 220-volt motor, one for each of the two intakes. To do away with flushing screens with town water a 190-g.p.m. salt water pump driven by a 15-hp., 220-volt motor has been installed.

Two 16-in. suction pipes are wyed into a 24-in. intake line leading from the pump house to the condenser, where two 16-in. nozzles serve the new unit. Motor-operated valves here save labor and time. Circulating water temperature range is 34 to 70 deg. F. The condenser discharges into two short 16-in. branches to a 24-in. pipe carried to the river below the pump house. The pump house well also serves the 3,500-kw. unit by a 20-in suction line which leads to a circulating pump in the power house. For flexible and economical operation, the circulating pumps of the two older turbine units may be run either with motor or steam drives.

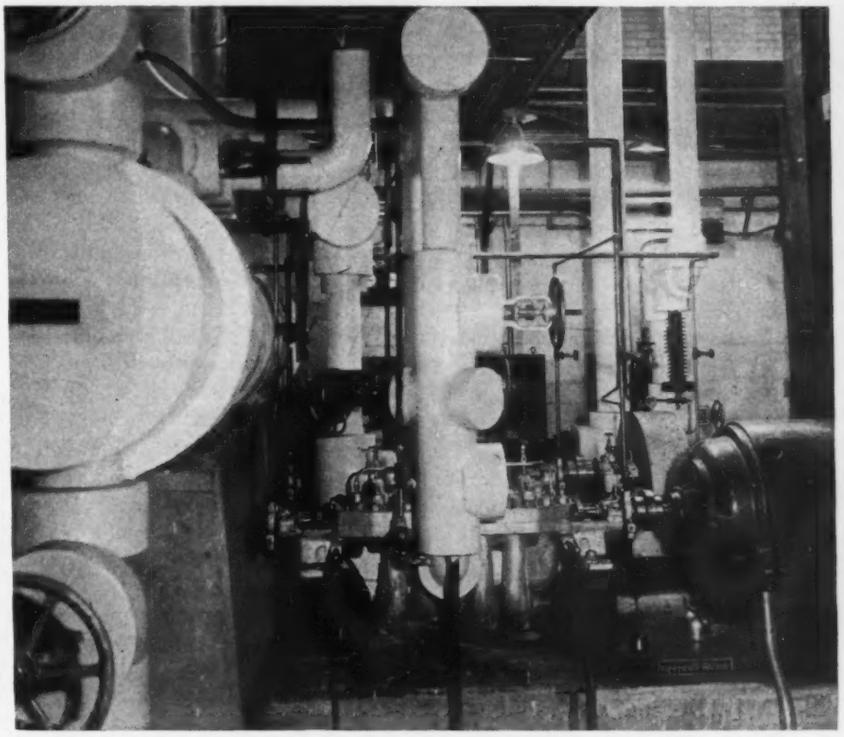
Electrical Improvements

A 2,500-Kuhlman transformer bank has recently been installed in the station yard to provide increased inter-bus capacity, replacing the earlier 2,000-kva. bank. This completes 5,000 kva. in transformer capacity, and the two buses are also connected through oil circuit breakers. This set-up enables the 13.8-kv. feeders to be supplied without transformation in operating the new unit on base load, while local 2,400-volt feeders are supplied from this unit through the transformers and low bus or, in case the 2,400-volt machines are in service, from these directly off the low bus. To enable either transformer bank to be taken out of service or any circuit breaker in the inter-bus connections opened, while continuing transfer of energy between high and low buses, a bus tie connection with selector switch control has been installed. Similarly, the two 2,400-volt generating units can be operated to supply either or both buses under peak load or in case of shutdown of the new unit.

Over-all Economy Improved

A comparison of 1940 and 1941 results shows a substantial gain in station economy from the use of the new unit on base loads. In 1940 the plant generated 24,396,000 kw.-hr. with a fuel consumption of 2,699,430 gal. In 1941, when about eight months' operation of the new unit took place, the output was 27,260,000 kw.-hr. and the oil consumption 2,802,344 gal. The energy produced per gallon was 9.03 kw.-hr. in 1940 and 9.73 in 1941. The station output rose 11.7 percent, but the fuel burned rose only 3.8 percent, for the year.

Station production costs in 1940 were $119,712 (4.9 mills per kw.-hr.), and in 1941 $119,881 (4.4 mills). In 1940 the department purchased 655,416 kw.-hr. at a cost of $14,525 (2.22 cents per kw.-hr.). In 1941 it bought 345,288 kw.-hr. at $12,103 (3.5 cents per kw.-hr. average). Boiler fuel cost was $89,057 in 1940 and $87,205 last year. Arthur L. Nelson Engineers, Boston, were consultants, and Ernest T. Fulton is department manager.



NEW boiler feed pump and heater installation

PRIORITIES PROBLEMS

Data for L-94

Case No. 17

What information does WPB's power division want from utilities reporting on non-utility generating capacities within their service area under paragraph b(3) of Order L-94? Equally important, what information isn't needed? These are questions arising almost daily as utilities proceed to comply with the section requiring them to survey the power capacity of their area and to arrange to have industrial and municipal generators help carry wartime loads whenever necessary and practical (see Cases Nos. 6, 7 and 15).

At this time paragraph b(3) of L-94 is being considered as a means for increasing capacities rather than to provide more kilowatt-hours. It isn't necessary, therefore, except in specific cases to determine in kilowatt-hours the generation and purchases of an industrial plant.

However, the amount of the non-utility's generation and purchases, in kilowatts, is wanted. So also is the 1942 peak demand, in kilowatts, in July and December (estimated) of the industrial plant, together with the kilowatts available to the utility at the time of the utility peak in the same periods.

WPB also needs to know the name-plate capacity of a non-utility generator and, more important, the actual capability of the station when boiler and auxiliary limitations are considered, as well as the type of prime mover, whether it is condensing or non-condensing, the kind of fuel used and whether any other fuel can be used.

Is the plant interconnected for parallel operation for interchange of power or simply connected to utility lines for the purchase of additional energy, and what is the capacity of any existing interconnection? Where only a connection exists, it may prove more economical of critical materials to sectionalize part of the utility load (see Case No. 6) rather than to integrate the two stations.

Estimates of the cost of interconnecting non-utility stations should be made by utilities in all instances meeting either of the following conditions —where the consumer purchases all or part of his power and has generating facilities of 100 kw. or more not being used to capacity or idle, and where a non-utility generator not connected at all has a capacity of 300 kw. or more. All facilities of less than 100 kw. are exempted from the order's provisions and isolated stations of less than 300 kw. are considered usually to be too costly in materials for the possible benefits, short of actual shortage conditions. Estimated cost data should be broken down into a dollar figure covering repairs to the non-utility generating equipment and for the necessary lines and substations, so that WPB can determine, in terms of materials, the relative benefits from possible interconnection or from rehabilitating the industrial unit so it can relieve the utility of load.

The allocation section of the power division has developed a standard form for tabulating this data, which utilities may obtain in order to synchronize their own reports.

Generating Station Materials Quotas

Case No. 18

Utilities have misconstrued Section F-4(iii) of Order P-46 in nearly a half-dozen different ways. This is the section permitting an increase over the 100 percent of 1940 base for deliveries, withdrawals and inventory of materials for generating station repairs and operating supplies in proportion to the increased system output.

Just recently WPB's power division received a letter from a large utility asking which of two methods for calculating the percentage increase was correct. Neither was. One of the utility's methods was to compare the second-quarter, 1942, operations with the second-quarter, 1940, operations to determine the quota for the second-quarter, 1942, repairs; the other was to compare the second-quarter, 1942, operations with the first-quarter, 1940, operations to get the second-quarter, 1942, quota.

In both instances it would be necessary to estimate second-quarter, 1942, operations in advance if the quota was to be of any value in determining what materials the utility could accept and use for repairs in its generating stations in the second quarter.

To determine how much material can be purchased, used and kept in inventory for the current quarter of this year, the correct application of the Section F-4(iii) formula is to compare the output in the third quarter of this year with the output in the third quarter of 1940. The percentage increase, 1942 over 1940, is the increase over 100 percent, dollar value, of 1940 purchases, withdrawals and inventory for generating station repairs and operating supplies to which the utility is entitled in the fourth quarter of this year.

RUTILITIES UNABLE TO OBTAIN DELIVERIES of heavy power and steam equipment ordered prior to issuance of Order L-117, regulating manufacture and delivery of such apparatus, should write to WPB's power division explaining fully the circumstances and need for the equipment and ask for a release from the order, rather than file a PD-1A application for a rating. Order L-117—covering boilers, turbines, generators, heat exchangers, frequency changers, synchronous condensers, mercury-arc rectifiers, large circuit breakers, metal-clad switch gear, etc.—limits deliveries to orders carrying an A-9 or higher rating assigned by a PD-3 or PD-3A certificate issued prior to May 18, or by a PD-1 or PD-1A certificate or a P-19h project rating issued at any time.

Thus, utilities which had equipment on order on May 18 on ratings from such priority procedures as P-46, or carrying no ratings at all, cannot now get delivery without a release. Proper method for obtaining this release is a letter; PD-1A applications should be made only on new orders.

Rebuilding Transformers

Case No. 19

Rebuilding of old transformers with a history of failures due to defective insulation is permissible maintenance under Order P-46.

A recent example points this up. The utility wrote WPB's power division that it had started a program of rebuilding two dozen single-phase, 500-kva., 24,000/4,800-volt transformers, all in service and all more than 20 years old. The utility was buying new coils from the manufacturer, scrapping the old coils and doing the rebuilding in its own shop.

The utility said it was ready to release another half-dozen units, all of which were now in use in an area operating at 40 kv., whereas previous failures had been at 24-kv. operation, and it wanted to know whether the program should be continued and what limitations of P-46 applied.

The power division replied that the program could proceed within the utility's materials delivery limits under Section F of the order. As P-46 is now written, withdrawal of the transformers from use represents a credit to stores and the subsequent reinstallation of the rebuilt transformers represents a charge against withdrawals; these cancel each other. Purchase of the new coils, however, is a delivery of material under the order against which there is no offsetting credit for the scrap value of the old coils.

Range Connections

Case No. 20

Supplemental Order P-46-b was issued by WPB's power division (ELECTRICAL WORLD, September 26, 1942, page 7) to give utilities blanket authority to make extensions for either electric or gas cooking service under specified conditions.

A number of utilities have asked whether they could extend the third wire (using not more than the maximum 15 pounds of copper permitted under P-46-b) for electric range service to homes with worn-out coal or wood ranges. They have been told that under P-46-b neither gas nor electric service may be extended if the residence has range facilities of any kind. In other words, at the time the application for electric service is made, the consumer must be without any range facilities and without gas installation which could be connected for cooking.

Another instance involves a home where both electric and gas facilities are installed and the customer, now using electric service, has remodeled the house into a duplex—the question being, can the third wire be installed for electric service to the second family suite? The utility was told that either gas or electric cooking could be connected.

The over-all intent of P-46-b is to recognize cooking as an essential and to provide for it by the type of service which involves the least amount of critical materials.

Farm Extensions

Case No. 21

The emphasis upon the need for increasing the nation's food supply frequently brings to WPB's power division priority applications for farm extensions which emphasize what electric service would do in terms of added food products.

Typical of these cases is one in which the utility wanted to extend service to a farmer who had just doubled his herd of cows in order to help supply milk to a nearby camp. The farmer wanted to install electric milkers and coolers because of the difficulty in getting hired hands and to enable him to meet stringent standards for his product. The utility stated that it had an unused line which could be relocated to provide part of the extension and that the farmer had obtained enough wire to complete the job, totaling about 1,500 ft.

At present, WPB regulations limit all new extensions to existing buildings to those which were wired before March 26, 1942. There is no exception for farms—decision is based upon the matter of lighting and not on the question of farm products.

As a result, the power division returned the application, pointing out that relocation of idle lines to extend service is prohibited (see Case No. 12) and that the extension could be made only with steel wire and only if the farmhouse had been wired for service prior to the cutoff date.

Extensions for Unrated Housing

Case No. 22

WPB's power division grants no exceptions these days to the regulations governing the amount of critical materials which may be used in making extensions to new housing. As a result a number of situations have arisen throughout the country where homes face the prospect of being without electric or gas service indefinitely. Copper wire, and pipe for gas mains, are both considered more valuable than living comforts—in the case of farms more valuable even than additional food production (see Case No. 21, farm extensions).

A simple PD-1A application from a metropolitan utility illustrates the point. The utility filed for permission to extend service to a single-family home built during the summer under a release from WPB's stop-construction order, L-41. The contractor had all his materials on hand when L-41 was issued and was permitted to go ahead—without first checking whether the utility would be permitted to extend service.

The extension required 52 pounds of copper, but the maximum permitted for extensions to homes built after April 22 is 30 pounds. So, the utility's application was turned down.

This situation has been corrected, so that no new examples should develop from home building in the future. All home construction is now given a rating under L-41 by WPB's construction division and the utility's PD-545 application for service extension, within the limits of the Housing Standards of August 25, 1942, is rated at the same time. Thus, new construction cannot be started without assurance in advance that the utility can provide service.

RIN CONSIDERING the capacity of an existing interconnection between a central station and a non-utility for purposes of paragraph b(3) of Order L-94, utilities should calculate the amount of energy which can be fed into the utility system rather than how much can be delivered to the non-utility. Purpose of the order's provision is to get power out of industrial and municipal generating stations to augment utility capacities for carrying wartime loads. If an interconnection is equipped to carry 1000 kw. into an industrial plant but, because of switching or other limitations, the industrial plant can only deliver 500 kw. to the utility, the capacity of the interconnection is considered to be only 500 kw.

Meter Tables Combine Strobo and Photo-electric

Design objectives: Maximum applicability to wide range of meters, minimum adjustment of optical elements in transitions, testing-time reduction

LESLIE D. PRICE, Public Service Electric & Gas Company, Newark, N. J.*

NEED for automatic or semi-automatic meter test facilities to increase the efficiency of shop meter testing has been recognized for some time. After investigation of this problem, engineers of the Public Service Electric & Gas Company have collaborated with the States Company of Hartford, Conn., in the design of an efficient, flexible and safe meter test table. The resulting test board has a combination stroboscopic test unit and photo-electrically controlled revolution counter. The board is designed for 240-volt, three-phase, three-wire, 60-cycle supply and provides for the testing of single-, two- or three-element watt-hour meters at a maximum current capacity of 50 amp. and voltage capacities of 120, 208 and 240 volts.

Objectives

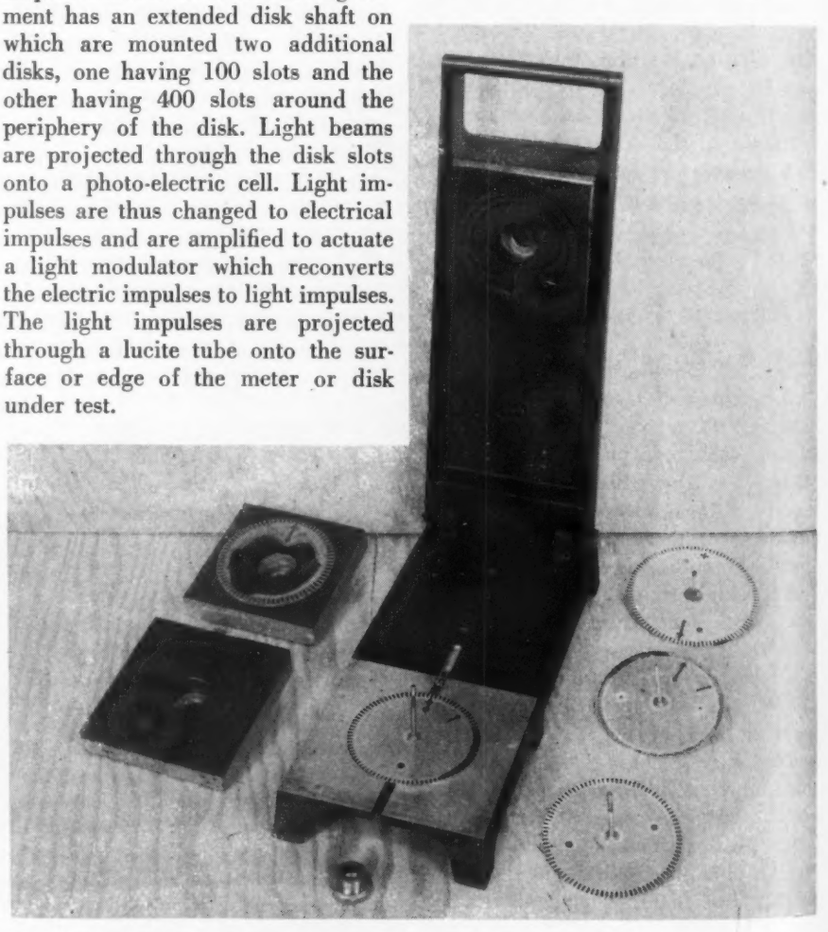
Testing efficiencies resulting from the use of the stroboscopic method of test at full load unity and 0.5 power factor were recognized, together with the advantages of automatic stop-start methods of standard control at light loads. A test board was desired that would afford a maximum range of use, providing test facilities for all old and modern types of single-phase and polyphase meters. In addition, a minimum adjustment of optical systems and automatic apparatus was required when changing from one type of meter to another. It was also desired that each meter should have individual attention during the time of its test.

The complete unit is built into a standard 34x60-in. steel desk, 30½ in. high. The left-hand drawer of the desk houses the strobo master meter and amplifying unit. The right-hand drawer of the desk houses a precision current transformer with multi-primary taps to provide the master meter with correct speed ratio irrespective of the capacity of the meter under test.

Master Meter

The master meter is a modified rotating standard with one- and five-ampere current coils. Its moving element has an extended disk shaft on which are mounted two additional disks, one having 100 slots and the other having 400 slots around the periphery of the disk. Light beams are projected through the disk slots onto a photo-electric cell. Light impulses are thus changed to electrical impulses and are amplified to actuate a light modulator which reconverts the electric impulses to light impulses. The light impulses are projected through a lucite tube onto the surface or edge of the meter or disk under test.

The impulses per revolution are used when strobo-testing meters with standard surface markings on the disk and the 400 impulses per revolution are used when testing meters with serrations on the edge of the disk. A double-throw switch controls the impulse source. A magnifying glass is used in conjunction with the modulator when viewing the disk serrations to eliminate eye fatigue.



DISK-STAMPING DEVICE for stroboscopic testing

*Meter and wiring engineer.

INCLINED dead-front control panel on standard 34x60x30½-in. steel desk houses auxiliary control equipment

ADJUSTABLE meter rack mounted at top center of panel to bring meter under test to eye level of seated operator

Adjustable swinging brackets are mounted on each side of mounting rack. Arm on left supports the light source and photo-electric tube housing; arm on right supports stroboscopic apparatus

Strobo-testing requires a minimum of adjustment of the light impulse source and is effective through the glass covers of meters. The stroboscopic and load controls are coordinated and are designed to provide test facilities for all meters having basic watt-hour constants of $\frac{5}{2}\frac{5}{4}$, $\frac{1}{3}$, 0.3 and 0.6.

Aids Polyphase Balancing

Modern meters are tested at full load and 50 percent power factor by use of the stroboscope. Considerable time is saved in the balancing of polyphase meters by use of the stroboscope. Full load and balance adjustments are made by setting the register indicator at a desired percentage of accuracy and turning the meter adjustments until the speed of the meter disk is brought into stroboscopic balance.

The photo-electric timer consists of a light beam, a photo-electric cell, an amplifier and relays that count the revolutions of the meter under test. The relays control the potential circuit to the rotating standard. The concentrated light beam may be focussed on the disk of the watt-hour meter so that the anti-creep holes in the disk permit the light beam to strike the photo-electric cell underneath the meter, or the light beam may be reflected from the surface of the disk to the photo-electric cell and interrupted by the black spot on the disk. Either method is effective, but the latter method is generally more efficient and requires little, if any, adjustment of the optical system. The potential circuit of the rotating standard is closed and opened in accordance with the predetermined revolutions of the meter under test controlled by a selector switch.

Light Loads

Light load tests are made by the automatic revolution control devices. Meters that are not adaptable to strobo-testing are also tested by this device. For "as found" accuracy tests, meter disks may be removed and replaced by stamped disks applicable to stroboscopic testing. A disk stamping device is shown in an accompanying illustration.

Loading current is supplied by a load transformer with auxiliary resistances and is adjustable by toggle switches in $\frac{1}{2}$ ampere steps.

Polyphase meter elements may be tested separately or in series by operation of a combination rotary and toggle switch. A 50/100 percent power factor switch facilitates the checking of meters at 50 percent power factor.

One of the features of the test board is the safety facilities provided. All switches are dead-front type. Insulation breakdown tests at 1,500 volts are made while the meter is in the test position by depressing two push buttons simultaneously. These push buttons are so spaced that they require the use of both hands of the operator, thus making it impossible for the operator to come in contact with 1,500-volt potential.

Trial tests on this table indicate that it will result in a marked increase in the efficiency of shop testing. For example, the shop testing rate of new single-element meters tested on this board has been increased 43 percent over the rate using conventional snap switch test methods and the shop-testing rate of new multi-element meters has been increased 80 percent over the rate using existing methods of test.

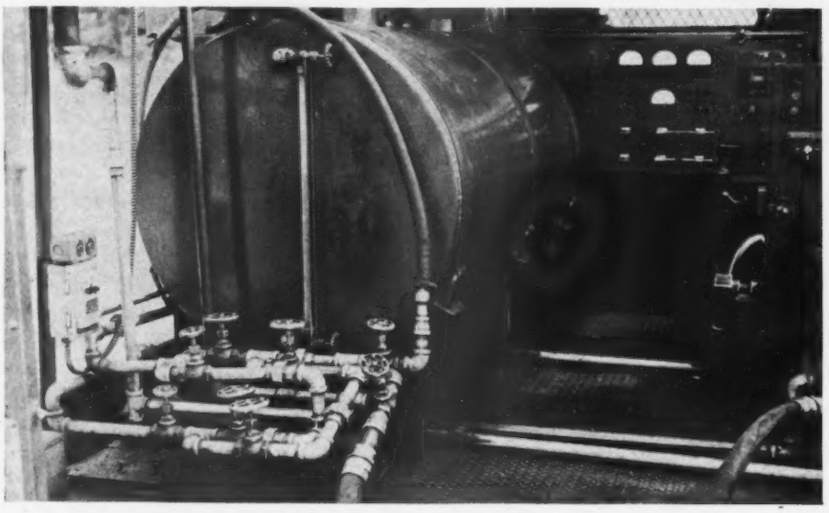
Meters removed from service show corresponding increases in test production. The board has proved to be of particular value in the adjustment of repaired meters, both single- and multi-element. In general, the desired results of efficiency, flexibility and safety have been obtained.

Truck Helps Field Transformer Repair

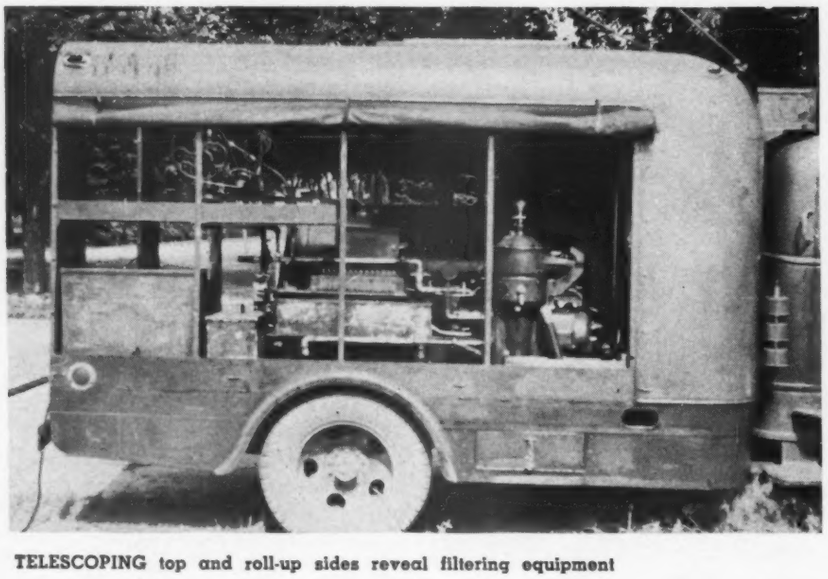
South Dakota utility designs truck to maintain distribution transformers in field — Built-in transformers carry load during maintenance operation

S. J. SICKEL,* Northwestern Public Service Company, Huron, S. D.

ALTHOUGH routine substation transformer maintenance has been followed for many years by most operating companies, a rising rate of failure among small distribution transformers has focused attention upon applying these same preventive measures to the small scattered installations.



ONE of two 90-gal. tanks used for storage of clean and dirty oil. Transformer switchboard is in background



TELESCOPING top and roll-up sides reveal filtering equipment

WHILE built-in transformers carry load, filtering equipment in maintenance truck cleans oil; truck houses 15-kva., 6,900-volt and 25-kva., 2,300-volt transformers

Under present material scarcities, replacement of damaged equipment has become difficult or impossible; thus some forms of maintenance and repair are virtually necessary even though no immediate economy is apparent.

The transformer maintenance truck shown was built to the specifications of the Northwestern Public Service Company for use in rural and scattered residential areas and incorporates several out-of-the-ordinary features to facilitate this type of work.

This mobile unit carries its own step-down transformers, a 15-kva., 6,900/115-230 and a 25-kva., 2,300/115-230. Brought out through the roof are two high-voltage and three low-voltage bushings, and rubber-insulated leads are used to reach the transformer location. These built-in transformers are equipped with external tap-changers, separate and polarity-reversing switch in the LV circuit. In use, the truck is driven directly under the pole-mounted transformer and the extension leads carried up and connected to the primary and secondary. The self-contained transformer is energized, secondary voltages are adjusted to balance, and the distribution transformer can then be removed without interruption to service.

The built-in transformers are also

*Assistant superintendent of transmission and distribution.

[*Continued on opposite page*]

Fusing Practice Reported by Pennsylvania Utilities

Objectives, practices and experience with the fusing of power and potential transformers and with repeater fuses for circuit protection*

DURING the past fifteen years power companies have increased the use of fuses on power transformers until today banks having capacities as high as 10,000 kva., 66 kv. are being protected in this manner. This has been partly due to advances made in the development of high-voltage fuses in the higher current capacities and higher interrupting ratings, and partly because the fuse is much cheaper than a breaker of the same rating.

In most cases the primary objective of fuses on transformer banks is for short-circuit protection. Modern fuses are especially suited for this service. In order to keep fuses from blowing on overloads, secondary feeder or apparatus faults they are generally selected with a continuous current rating varying from 200 to 400 percent of the full load current of the bank; whenever a primary bushing or winding fails the fuses will clear the faulty transformer from the line in less time than the standard breaker.

Next in importance was to prevent or decrease outages to other customers.

**Adapted from recent report of D. S. Roush to electrical equipment committee of Pennsylvania Electric Association.*

Objectives and Disadvantages

Some reasons for using fuses are as follows:

1. Short-circuit protection.
2. Overload protection.
3. To prevent or decrease outages to other customers.
4. Economic considerations.
5. Damage reduced due to quick clearing.
6. System shock reduced due to quick clearing.
7. Difficulty in securing breakers due to material shortage.

Some disadvantages of using fuses are as follows:

1. The possibility of one fuse blowing, thus single-phasing the power source.
2. The fuse offers the same hazard as single-phase disconnect switches if they are pulled under load, namely, danger to the operator and equipment.
3. Difficulty of selecting fuses with adequate interrupting ratings.
4. The current-limiting fuse operates so fast that it is practically impossible to coordinate other protective equipment with it.

Very little trouble has been experienced with single phasing, due to the fact that most companies are fusing for short circuit. Also it is the policy of most companies when selecting fuses to make sure that the duty is within the interrupting rating. Results have been most satisfactory.

In many cases a high-tension horn gap switch in conjunction with a fuse is all that can be economically justified on the high-voltage side with an adequate oil or air circuit breaker on the low-voltage side. However, this is not always considered the safest installation due to the fact there are many safer and better ways of doing the job. Some companies feel that this is more of an economic than an engineering problem.

If you consider the replacement cost, value of good will and cost of an extended interruption for a combined fuse and disconnecting switch installation failure, the cost is not always a cheap one.

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convenient when maintaining regulators, circuit breakers and other equipment where an adequate 220-volt supply for operating the pumps, heaters and centrifuge may not be available.

Two 90-gal. tanks are used for storage of clean and dirty oil. A transfer pump of ½-hp. size makes it possible to wash out sludge and sediment, refill or pump out transformers or to empty barrels without interfering with the normal centrifuge operation.

The roof of the truck has a telescoping section which may be opened to permit lowering transformers directly onto the bed of the truck. A power winch large enough to handle any pole-mounted transformer is installed directly behind the cab.

Oil cleaning apparatus is of standard design, comprising a 300-g.p.h. centrifuge, filter press and heaters. Oil is recirculated through the centrifuge with the filter-press by-passed until it tests at least 25 kv. One pass through the press then brings the dielectric strength to 30 kv. and it is delivered to either the "clean oil" tank or to the transformer. All by-pass and control valves are grouped together for convenience and are located so they can be operated from either inside the truck or from the ground. As a safety feature, to prevent accidental contamination, no cross-connection is made between "dirty oil" and "clean oil" tanks except through the centrifuge and filter press.

This truck is now being used for the second full season and has fully met expectations in convenience and economy in the type of work for which it is designed.

Questionnaires were distributed to eleven companies. The following is a résumé of the answers:

Transformer Bank Protection

Fuses are in general used for transformer bank protection. The maximum kva. and voltage of several of the companies is as follows:

6,000 kva.—44 kv.; 1,500 kva.—13.2 kv.; 1,000 kva.—66 kv.; 3,000 kva.—33 kv.; 7,500 kva.—34.5 kv.; 10,000 kva.—66 kv.; 2,000 kva.—22 kv.

Most companies are fusing for short-circuit protection. Several are fusing in order to—

1. Prevent or decrease outages to other customers.
2. Economic consideration.
3. Damage reduced due to quick clearing.

In several cases the ratio of fuse current rating to full-load current of the bank varies from 2 to 1 to 4 to 1. One company has no definite ratio, but takes into account the time current characteristics of the fuse with respect to other protection timing on both high and low tension. Another selects fuses to coordinate with low-side breakers and fuses.

Generally the practice of coordinating the protective equipment on the low-voltage side with the fuses on the high-voltage is done and done successfully. However, one company reports that although it attempts to fuse for low-tension faults this selectivity limits the ability of the fuse to blow on low-tension phase-to-ground faults on delta-wye banks and also limits the ability of the fuse to blow on low-tension faults involving any appreciable fault impedance.

As to an attempt made to coordinate the transformer bank fuses with relays (phase and ground) that are located between the source of supply and the bank fuses, several companies report yes and several report no. One company reports that in general coordination is obtained with phase protection, but it is not possible in all cases on ground protection.

Is a given fuse schedule followed, using the same size of fuse with the same size of bank in all cases? Several companies report yes and several report no. However, a number of companies do have fuse schedules for distribution transformers tapped to 2.3-kv., 4-kv. and 6.9-kv. circuits.

In most cases load is dropped on the low-voltage side of the bank by means of an oil circuit breaker or other suitable low-tension breaker, while the charging current is opened on the high side by means of a non-automatic oil circuit breaker or high-tension group-operated switch.

Interrupting Capacities

When selecting fuses it is the policy to select fuses so that the duty is within the interrupting rating. Generally the results have been very satisfactory.

The fuses perform satisfactorily up to interrupting rating except that certain liquid fuses have given trouble particularly when operated at near full rating.

Fuses are reported to perform as satisfactorily at low currents as at higher currents. One company says experience does not permit a comparison between the interrupting ability at high and low currents. Several companies report yes.

No check has been made on the time-current characteristic of fuses as given by the manufacturers, except in an instance where one user has substantiated the published data of one manufacturer.

Generally no checks have been made on the manufacturers' published interrupting ratings. However, there is a question in the mind of one user of liquid fuses regarding how much clearance to provide in order to obtain the published interrupting rating.

Has any trouble been experienced from fuses not being able to carry their published continuous carrying capacity satisfactorily? This is apparently no problem under the present fusing policy of most companies. The ratio of fuse capacity to full-load current varies from 150 percent to 400 percent in most cases.

Has any difference been found in the continuous carrying capacity in fuses with silver, tin or other metals in links? One company has experienced considerable trouble with aluminum wire fuse, particularly in the smaller ratings. This trouble, however, was due to oxidation and crystallization.

Fuse Replacements

Most companies are replacing only the blown or defective fuses on high-voltage installations.

Is it the practice to replace fuses periodically regardless of whether they have been blown, carried overload, etc.? Most companies replace fuses only when there is some indication of deterioration or defective condition upon visual inspection. However, one company replaces copper fuses yearly. Another company has certain stations where fuses are replaced periodically regardless of their condition due to the atmospheric condition in these localities.

Repeater fuses are in use on most properties on 2.3-kv., 4-kv., 4.8-kv., 6.9-kv., 11-kv., 13.8-kv., 22-kv. and 33-kv. circuits.

In several cases they are used for both entire circuit protection and for sectionalizing purposes; in another case they are used for entire circuit protection on 4-kv. and for sectionalizing on 13.8-kv. lines.

Mechanical trouble, failure to reclose, all links blowing at once are difficulties reported; four different makes of fuses are employed. One company reports that on two 22-kv. installations no trouble has been experienced with five operations on one set. One case of trouble was experienced on each of two 4-kv. installations due to failure to reclose. Performance of the later types of repeater fuses is generally very satisfactory.

Types of Fuse Mountings

Several companies report that the disconnecting type of fuse mounting has been found to be most suitable for fuse replacements. Several companies have had very satisfactory results with a clamp type of mounting. Pole-pull mounting is not liked due to numerous cases of breakage when replacing fuses. Several companies have replaced this type with the disconnecting type mounting.

Several companies have experienced some single phasing of motors due to blowing of one fuse. However, since many companies fuse for short circuit only, this has not been a problem.

The general trend has been to increase the use of fuses and to extend them to higher capacity banks.

The approximate number of high-tension fuses used on the various systems were as follows: 48; 280 (sets); 110 (sets); 100 (sets); 150; 155; 175 of 2.4 kv., 50 of 13.8 kv., 60 of 33 kv. and none of 66 kv.

The various companies have been using high-tension fuses for from 15 to 40 years, with an average of 24 years.

The company having 280 sets of high-tension fuses reported 110 oper-

ations per year, a company with 150 reported only 10; some presumably had no record.

Potential Transformer Fusing

Primary fuses are chiefly used on potential transformers for protecting the supply line or system from faults which might occur in the transformer and its primary connections, or both. Fuses have been developed which are capable of handling the short-circuit current on a power plant bus, protect the transformer against secondary short circuits or internal faults. However, due to modern design of potential transformers, the question arises whether or not there is a real necessity for the use of protection between transformer and system.

Questionnaires sent out on protection of potential transformers elicited replies as follows:

Primary fuses are used by most companies on all bus potential transformers on all voltages up to and including 66 kv. Two companies fuse for all voltages. One company eliminates fuses above 4 kv.

Policy regarding the fusing of line potential transformers is divided. Several companies do not fuse at all. several fuse all voltages and several fuse potential transformers up to 66 kv.

In four cases secondary fuses are used for clearance purposes and are coordinated with primary fuses on bus and line potential transformers. In the remaining cases no secondary fuses are used.

Generally primary fuses are not selected to operate for secondary faults. However, several companies select primary fuses to operate on secondary faults at or near the secondary terminals.

On the practice of distinguishing between use of fuses for billing meters, switchboard meters and relays, the answer was divided. Four companies do not fuse potential transformers serving billing meters, etc., while five make no distinction.

Four manufacturers' types of high-voltage fuses are used and all types have operated successfully?

At locations capable of developing high short-circuit currents both current-limiting resistors and current-limiting fuses are used. To date both types have functioned satisfactorily.

No particular troubles have been experienced with the current-limiting resistor or current-limiting fuse. No unfavorable results have been obtained due to the omission of fuses.

Four companies use fuses of same voltage class as the circuit on which they are installed. Five use fuses of next higher voltage class.

In determining the correct size of fuse for a particular potential transformer installation, one company normally uses a 2.0-amp. fuse on all 25 kv. for high mechanical strength. Several companies do not fuse less than 1.0 amp. Another has standardized on the 0.5-amp. fuse due to the fact that it has found from experience that this capacity is sufficiently large to withstand the inrush of current when the transformer is energized. Several companies adhere strictly to manufacturers' recommendations.

Several companies use regulator potential fuses and several do not. One company uses only 30-amp. secondary fuses. Another uses primary fuses and 30-amp. secondary fuses.

The approximate number of high-tension potential transformer fuses used on the reporting systems was as follows: 150 sets; 100 sets; 175 sets; 78 of 2.3 kv., 897 of 4 kv., 87 of 11 kv., 171 of 22 kv. and 39 of 66 kv.; 100; 600 of 2.4 and 4 kv., 2,000 of 13.2 kv., 30 of 33kv. and 50 of 66 kv.; 75 of 4 kv.; 700; 400.

Calculator Applied to Industrial System

Layout that limited short-circuit duty to interrupting capacities of circuit breakers introduced conditions of instability the avoidance of which required change in the proposed design

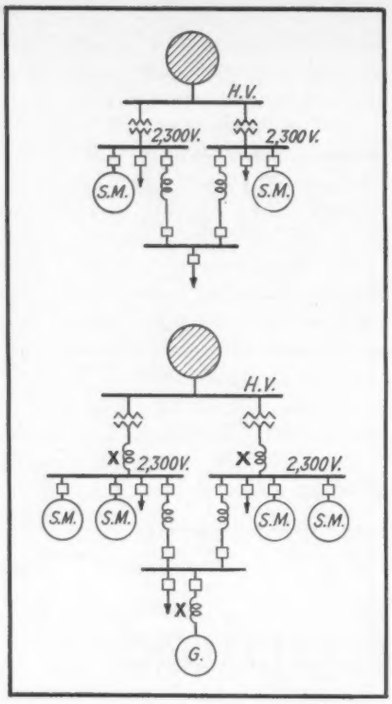
W. W. PARKER,* Westinghouse Electric & Mfg. Co., East Pittsburgh

COMPLIANCE with WPB order L-94, which requires integration of electricity production facilities and which will increase interconnections between generating capacity in industrial plants and in utility systems, gives rise to many problems of stability and of short-circuit protection. Implicit in these problems are the necessities for limitations of interrupting duties on circuit breakers and for maintaining adequate standards of safety and service. Sometimes new difficulties arise in maintaining synchronism and in other aspects of operation, difficulties that did not exist previous to interconnection.

Illustrative of these problems and of their solutions by the use of the a.c. network calculator is the following recital of conditions and studies in a particular case. This was an industrial plant in which additional large synchronous motors and a generating unit were to be installed. The requirements were to design the connections of the electrical equipment so that the existing breakers would be adequate as far as short-circuit duty is concerned, and yet that the synchronous motors would not pull out of step for faults either in the industrial plant or on the power company system.

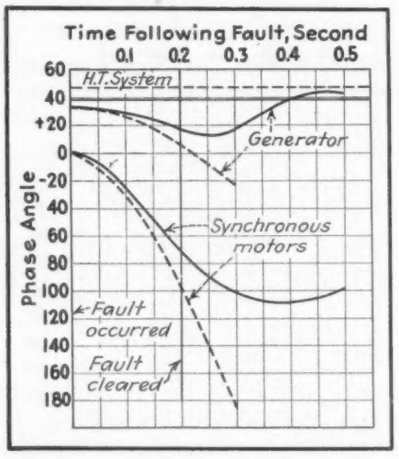
The original layout is shown in one of the accompanying diagrams. Another shows the new equipments added and how it was proposed to connect them into the system after determinations of short-circuit currents for various possible connections had been made. These studies indicated that it would be necessary to put reactances "X" in series with the transformer banks and the new generator to keep the short-circuit currents within interrupting limits. The transient stability of the system was then investigated and the effect of a fault on the power company's system considered. This indicated that the increased reactance from the power company system to the motors would decrease the stability limit. It would

*Switchboard engineering department.



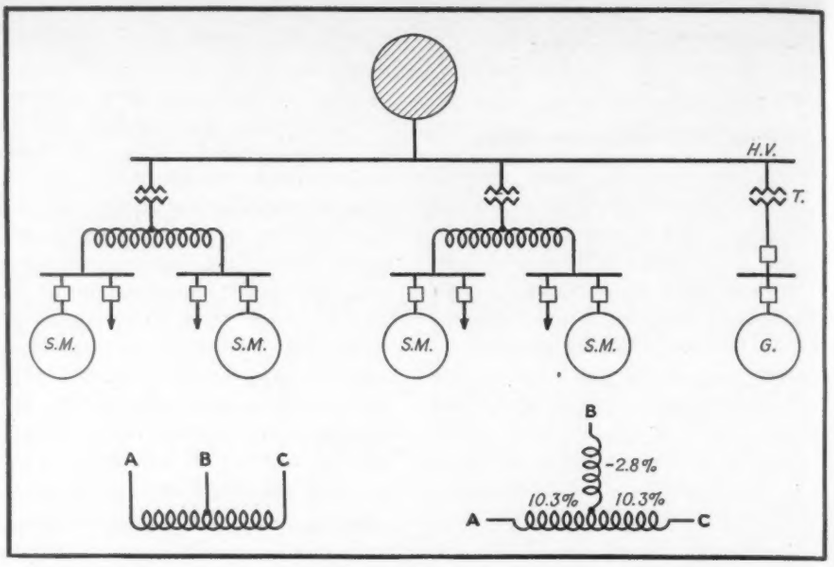
ORIGINAL (top) industrial system supplied from utility system (cross-hatched circle)

Proposed layout (bottom) of system with two new synchronous motors and generator added. Reactors "x" shown by network calculator studies to be necessary to hold short-circuit currents within breaker ratings.



CURVES of indicated stability under conditions of first proposed layout (dotted lines) and final layout (solid lines).

Phase angles of generator and of utility system are referred to phase position of synchronous motors taken as zero. When fault occurs on the supply system the phase-angle differences between it and the rotating machines on the industrial system begin to increase. When the fault is cleared the machines pull back into synchronism under the conditions of the midpoint reactor layout (solid lines), but do not do so under the conditions of the layout first proposed (dotted lines). It is to be observed that the curved lines show smaller phase-angle differences — smaller intervening reactance —between the supply system and the machines in the industrial plant.



SYSTEM as installed with midpoint reactors which combine high reactance against short circuits within the industrial system, thus limiting breaker interruption duty, and low reactance in cases of faults external to the system, thus assuring stability

The small diagrams show the characteristics—windings AB and BC each rated 7.5 percent at 7,500 kva.; mutual coupling, 37.5 percent—and the equivalent circuit of the midpoint reactor. Transformer "T" was a spare, put into use.

therefore be desirable from this standpoint to keep the reactance as low as possible. On the other hand there had to be sufficient reactance to keep short circuits within existing breaker ratings.

The solution to the problem was reached by the application of midpoint reactors, shown in the third diagram. These were designed so that the through reactance between the power system and the synchronous motors as a group was less than standard two terminal reactors, and yet the short-circuit duty on any bus was within the breaker-interrupting capacity. This resulted from the characteristic of midpoint reactors which have low reactance for currents entering at the midpoint, and high reactance for through currents—that is, from one end of the reactor to the other. This can be seen from the equivalent circuit included with the diagram of the final layout. The solid lines in the stability curves show that the stability of the system was greatly improved by the midpoint reactors.

This is only one of a number of calculator solutions of particular problems, each of which has required individual study and an individual design based on maximum utilization of existing equipment. If the illustrated problem had been the design of an entirely new station, in which new transformers were to be purchased, the transformer could very well be designed with double secondaries so arranged as to give the same impedance characteristics as the combination of midpoint reactor and standard transformer.

•

Consider Alternative Transformer Types

When additional transformers are required, particularly during these wartime conditions, some thought given as to location, rating, method of cooling, etc., may be helpful in obtaining one or more units at an earlier date and at the same time employing apparatus which uses minimum amounts of critical materials.

Here are three alternates to be considered for transformers:

1. Air-cooled type is available in a large number of ratings and requires no steel plate to be diverted from the war effort.

2. Forced oil-cooled type may be suitable for the job; it uses considerably less critical material than those cooled by normal oil circulation.

3. One three-phase transformer utilizes less steel and copper than three single-phase units of a total equivalent capacity.

Wartime Substitutions and Changes

Specific instances in utility practices of how shortages are replacing familiar materials and methods with different things and ways

THESE INSTANCES of substitutions in materials and changes in practices are from the experience of the Alabama Power Company. They were presented at a recent meeting of the engineering and operation section of the Southeastern Electric Exchange by L. M. Smith, electrical engineer of the company. The list makes no pretense of being an inclusive statement of substitutions and changes in the electric utility industry; it is not complete even as regards Alabama Power. However, its 56 items are impressive in number and are representative of the conditions that surround electric utility operation today. The list is thus of real value to utility engineers and operators for they can check their own revised practices against it and perhaps find in it suggestions for solutions of some of the problems that now face them.

Design and Construction

Substitution of timber "A" frame structures in a new double-circuit 110-kv. line for which plans had already been made to use galvanized steel.

Use of treated timber for substation structures, foundations, pull-box covers and fence posts.

Fabrication of new steel structures from used galvanized steel retired from various jobs.

Use of painted black steel for small structures in place of galvanized steel.

Use of concrete pedestals where practical instead of galvanized steel.

Reduction in the weight of steel substation structures by welding instead of bolting.

Simplification of certain steel column footing designs by the elimination of plate and angle assemblies.

Use of steel bolts in place of copper alloy bolts in low-voltage switchgear.

Use of bare copper cable for low-voltage buses instead of tubing or bar.

Use of rubber-jacketed cable laid directly in the ground in place of lead-covered cable installed in conduit.

Use of single-conductor cable, as needed, in place of multi-conductor cable.

Reduction of the insulation thickness in cables to conserve rubber or synthetic compounds.

Use of "Danger—High Voltage" signs made of painted masonite.

Substitutions from salvage in line hardware, insulators and other items.

Use of steel wire for short, lightly loaded primary extensions.

Hand-serving of low-voltage connections and of light anchor guys to reduce the use of clamps.

Use of wood slug anchors for guys on distribution lines.

Omission of primary arresters, or the relocation of nearby arresters when new installations of distribution transformers of the conventional type are made in the vicinity of existing transformers.

Use of galvanized steel pipe instead of copper for power transformer and circuit breaker oil lines.

Use of steel piping in place of Admiralty metal in new steam plant feedwater heaters.

Use of cast-iron terminal connection boxes instead of aluminum boxes in outdoor substations.

Use of special fiber flashing in place of copper for building spandrels and roofing.

Use of Masonite instead of sheet steel for the cover and walls of outdoor breaker cabinets.

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Operation and Maintenance

Removal of two composite steel and aluminum overhead ground wires on 74 miles of 110-kv. line to permit its use as conductors on a new 110-kv. line.

Operation of distribution transformers serving residential loads at 150 percent rating on peaks instead of 135 percent.

A change in type of multiple street lamp being used, resulting in longer life and a corresponding saving in car travel for replacements.

Replace only the phase wire on services where the weatherproof covering has fallen off, leaving the bare neutral in place.

Use of one bare wire on services to housing projects to conserve weatherproof wire.

Use of wood mallets instead of steel sledge hammers for dislodging coal from railroad cars, and ashes from ash cars.

Repair of worn pump and crank shafts by welding on new material and remachining.

Repair of small bronze sleeve bearings, which wear unevenly, by babbitting the worn portion and by rotating the sleeve to bring new bronze into position for wear.

Repair of large bronze sleeve bearings, where wear is uniform, by boring out the bearings to take bushings or by tinning and lining with babbitt.

Use of rubber hose for bushings on pins in flexible couplings of governor pressure pumps.

Making of air compressor belts by cutting good sections out of old and larger belts.

Rebabbitting of stoker line shaft bearings with babbitt made up of scrap lead from old control and power cables.

Making of intricate equipment parts by hand from scrap pile parts, where impossible to buy or where delivery of new parts is unsatisfactory.

Repairing of parts of equipment removed from service years ago because worn or broken and their reuse for emergency service.

More frequent inspection of generating plant equipment to detect parts that could be replaced or repaired before failure.

Keeping a complete record of all idle or partially loaded circuits, transformers and other equipment for possible use in an emergency.

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Warehouse and Shops

Reworking and redesigning old hookstick and gang-operated switches, oil circuit breakers and other equipment for reuse in new construction.

Removal of insulation from old soft-drawn weatherproof wire for use as tie wire in place of purchased tie wire.

Reuse of jewels from meters and instruments after inspection, cleaning and remounting.

Manufacture of new relay contacts from salvaged materials.

Repair and replacement of broken parts of meters, relays and instruments with bronze, bakelite or steel.

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Automobiles and Trucks

Use of trains and buses wherever practicable to conserve tires on company automobiles.

Resetting of governors on passenger automobiles from 50 miles per hour to 40 miles per hour.

Equalizing of the mileage use of utility passenger cars by a careful control of assignments.

Checking of the air pressure in tires before each trip from the central garage.

Switching of tires on cars more frequently to equalize the wear.

A weekly inspection of the steering mechanism, brakes, tires and lights of line trucks.

Removal of rubber mats from trunk compartments as an aid to the national salvage program.

Rebuilding of automobile engines, transmissions and other parts for an indefinite period of service.

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General

Economies in the use of stationery and a reduction in the number of forms and reports required.

Changes in office hours to help relieve congestion on public transportation systems.

Use of women on drafting boards for tracing, mapping, drawing revisions and the making of charts and exhibits. One woman is also being trained as a meter tester and one is serving as telephone operator in the chief load dispatcher's office.

The use of girls to replace boys as messengers.

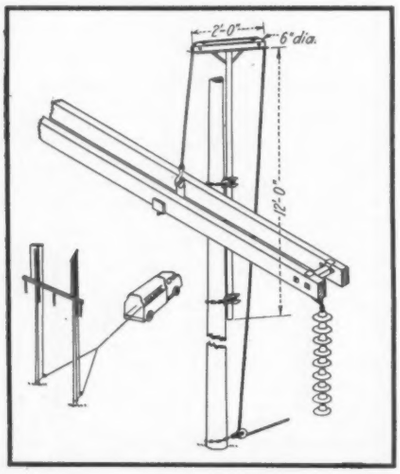
Unit Crossarms Erected by Gins

Improvised rig found better than raising fully assembled structure or adding arm piece by piece after erection

J. M. DYER, Southwestern Light & Power Co., Lawton, Okla.*

IN BUILDING a 138-kv. transmission line using wood poles and factory-assembled double fir crossarms the Southwestern Light & Power Company had previously decided that for accurate structure and arm leveling it would be inadvisable to attempt to put the structure together on the ground and then hoist the entire set-up into place. Due to the height of the structures to be erected, the correct type of equipment for the proper working of this method was not on hand, and it was deemed inexpedient to purchase this. Another method would have been to disassemble the crossarm on the ground and after the poles were up to install the arm, one member at a time. This appeared to be time and labor consuming, and so crossarm gins were designed and constructed as illustrated, to allow the arms to be installed as a unit.

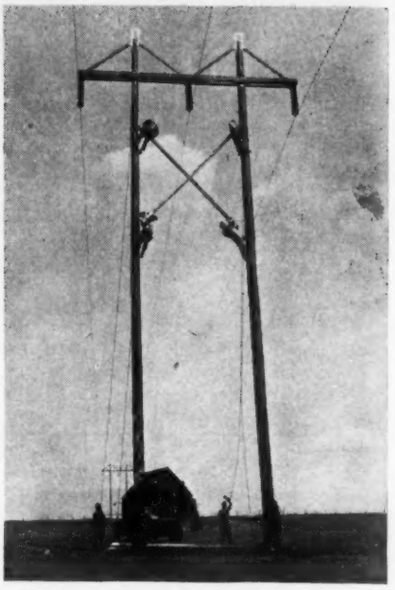
* Transmission Engineer.



METHOD of using gins, with details of attachment to pole

Made from Scrap

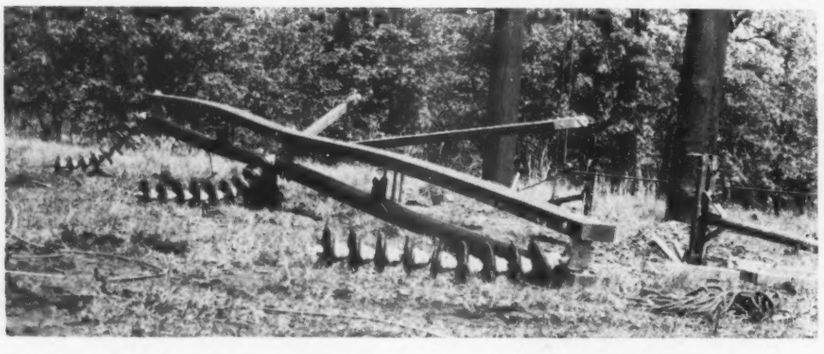
The gins were made of scrap pieces of angle-iron, straps, metal sheaves, chains, etc., the only material purchased being the pipe, which is high-strength steel tubing. All material is welded. The bottom section of the gin, where it is clamped to the pole, is reinforced with a smaller diameter of steel tubing inserted inside and extending from the bottom of the gin to a point several inches above the upper clamp. The clamp itself is merely a chain, with a bolt welded on the end and a nut with a handle to enable the chain to be drawn up tight. A head and a base were welded to two hydraulic jacks, so that the arm could be spread, allowing it to slip freely over the pole top down to the gain.



ELECTRIC DRILLS bore 15/16-in. holes for cross-brace mounting bolts, energy being supplied by gasoline engine-driven generator on truck

In installing the crossarms the following procedure was used: (1) Gins were raised independently of each other by two ground men, using a few turns of the line around a cathead on the winch, one cathead being on each side of the truck; (2) linemen clamped gins in place while the arm was being spread with the jacks; (3) a line was then run from the arm over the gin sheaves and down through snatch blocks tied to the poles close to the ground line, to eliminate as much bending as possible on the gins; (4) the winch line on the truck was then hooked to the line on the crossarms, which gave the effect of an equalizer and enabled the arm to be raised in a level position; (5) arm was raised to the pole top and lowered to the gain, the arm carrying insulator strings and inside Vee braces; (6) bolt holes for cross-bracing mounts were electrically drilled on the poles, energy being supplied by a 1,500-watt generator on the truck bed.

By this method a maximum of 18 crossarms per day was installed, with a daily average of eight for the 104-mile line.



SPREADING crossarm with hydraulic jacks before hoisting to pole top

Breaker and Switch Contacts Resurfaced With Silver Alloy*

Application of new surfaces to impaired contacts is not difficult and will pay dividends in improved switch and breaker performance

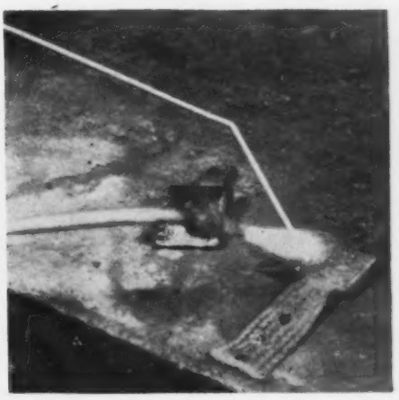
SELDOM is it necessary to discard severely pitted oil breaker and air-breaker switch contacts. They may be rebuilt with sil-phos or phos-copper and silver plated (to reduce the resulting high contact resistance) and returned to service. If a high-voltage transmission line is equipped with flat cast bronze contact shoes as part of the sectionalizing switches, it is well to investigate the hazard of contact deterioration, as a result of a combination of copper and zinc oxides and repeated fault currents, which might be corrected by a planned program of silver plating.

Accompanying illustrations show steps in building up the faces of oil circuit breaker and air-switch contacts with sil-phos and a gas torch.

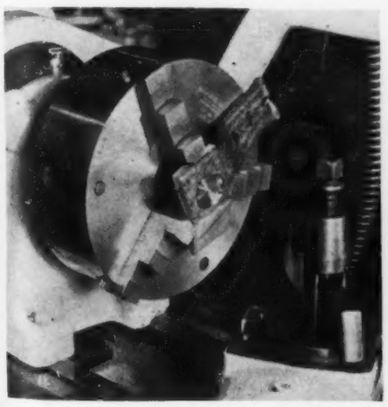
*From paper "War on Waste," by Lawton M. Limpus, Oklahoma Gas & Electric Company, presented at Missouri Valley Electric Association

1 Characteristic appearance of deteriorated contacts

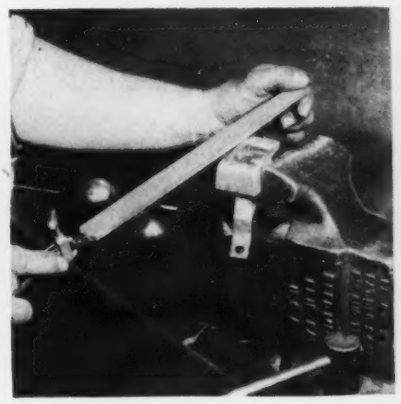
2 Grinding an air break switch contact before adding sil-phos



3 Applying sil-phos to contact surface with acetylene torch



4 Turning contact after sil-phos has been added



5 Filing oil circuit breaker contact after applying sil-phos

6 Finished job on three kinds of contacts

Editorials

S. B. WILLIAMS, *Editor*

Has the WPB-FPC Treaty Been Abrogated?

NOT QUITE six months ago the White House released an agreement between WPB and FPC defining the responsibility of each with respect to power. Within the past two or three weeks the President has made a suggestion to the heads of the Army, Navy, Maritime Commission and federal loan administration that will have the effect of nullifying a major part of that agreement.

This directive suggests that power for war plants be purchased directly from the lowest cost sources and that where such sources did not then serve the area that they send the power over another's lines. The "common carrier" would charge a transmission cost. To carry out this policy the Federal Power Commission is to use its emergency powers to make transmission and other facilities available.

Under the WPB-FPC "treaty" WPB was charged with the responsibility for "power supply to specific military establishments and war industries and the development and administration of programs for coordination of transmission lines and power plants to assure an adequate supply." The recent presidential directive would seem not only to abrogate this part of the "treaty" but to place in the hands of FPC, if it wished to exercise the right, full authority for determining from what source any war plant, Army or Navy establishment or federally financed project would purchase its power needs. Not only that but the commission would be empowered to make available all necessary facilities, which would appear, on the face of it at least, to give FPC the authority for determining new construction and for allocating power supply.

Ever since WPB order L-94 came out the utilities have been working on regional integration plans. This directive deals a blow to such plans by making cost of generation and not power availability the primary criterion, as well as by directing consumers to buy from the low cost producers direct.

The directive on the face of it appears innocent of any intent other than to save the government money. In spite of the fact, however, that the directive stated that it would not discriminate in favor of public or private power, the center of immediate agitation is in the Northwest, where the most effective regional integration of power resources on a large scale is in operation. The immediate effect of this directive would be for Bonneville to supply power over the lines of private companies to customers in the service area of others as an independent agency instead of a member of an integrated power pool.

If the private companies are making any substantial profit on power sold to war plants the government, through taxes, has a most efficient way of recapturing almost all of it.

Directives such as this do more harm than good. They are written without a full knowledge of all the implications and should be withdrawn before they hurt the war effort.

Distribution Systems for War Plants

MORE PLANNING of industrial distribution systems to meet peculiar plant requirements has arisen out of the unprecedented expansion in production plant facilities in the past two years than probably in any previous decade. Necessity and opportunity were the stimuli, necessity to provide continuity of service for war production and at the same time conserve our critical materials, and opportunity to fit an electrical distribution system to a predetermined load and production layout.

Some of these new war plants are amazing in their proportions and their loads. They are designed jobs throughout, making use of every modern advance in engineering. And so there has been an evolution from the old simple radial system that took service at one or more points outside the building and thence by low-voltage feeders to distributing panels and out by branch circuits to individual loads.

New engineering thinking on the problem of plant distribution has evolved the loop primary, banked primary, primary selective and secondary selective versions of the radial system as well as plant versions of the low-voltage secondary network system originally designed for central station service.

There should be no disposition, however, to confuse the remarks in the September 5 editorial about the limitations of those utility networks with the potentialities of the network adapted to industrial plant requirements. The industrial-plant network system with primary selective switches, conventional transformers and network protectors, along with newly developed interrupting devices for clearing secondary-tie-cable faults, has stimulated a broadened use of the network principle, and in a number of cases has shown a saving in critical material. This has been accomplished by incorporating features in the plant network system which might not be generally applicable to metropolitan networks.

Experience meanwhile has shown that there is no single method of distribution universally applicable for

all plants. Such dominant factors as the character, size and pattern of the load, along with considerations of reliability and flexibility, voltage regulation and the imperative conservation of materials, are the criteria for decision.

The industrial plant electrical engineer has thus been confronted with many of the same problems that haunted the utility distribution engineer a few years back. But, in arriving at today's decision for the most appropriate and most patriotic system, he should realize that there is a wider choice open to him, whether it be one of the modernized networks or some modification of a radial system.

Relief for Electrical Dealers

AT THE RECENT MEETING of league managers it was the consensus that the dealer mortality situation as the result of war measures was not nearly as bad as had been expected. There have been many losses, but at least half of the dealers are expected to remain in business throughout next year. These figures relate to purely electrical dealers and do not include any department, hardware, furniture and similar non-electrical stores.

While some stocks of appliances will be unfrozen, these dealers mainly will be kept alive by repair business. So far they have been extremely busy as a result of utility campaigning to get customers to have their appliances placed in good condition.

The fly in the ointment right now is labor and price ceilings. Even if there is plenty of business to carry dealers over, a great many will prefer to close up rather than work hard and perhaps take a loss. The facts have been presented to a committee of Congress by the manager of the Washington league, but ways should be found to buttress this testimony if dealers are to get relief.

Every effort should be made to save these dealers, principally because of their essential service to the public. These electrical appliances are more necessary than ever to get the housework done. Without these dealers there would not be a sufficient number of trained repair people to keep these appliances in order.

Utility Machine-Shop War Work

PRACTICALLY every power plant has machine-shop equipments of some sort to make repairs to power apparatus and practically all of them are standard tools. They are there primarily to expedite restoration of generating capacity to service and to that extent should be counted in with reserve capacity and stocks of spare parts as insurance against service to war industry. And there are few power systems today that do not have some load essential to prosecution of the war.

Under these circumstances government agencies should not put pressure on the utilities to turn their lathes, millers, boring mills, grinders, etc., over to industrial plants. Admittedly they may be needed for use relatively few hours per year, but in those hours they are indispensable. More so now than ever because replacement parts are harder to get quickly from the manufacturers.

Far better would it be for WPB to assist the utilities in getting sub-contract jobs to keep their machine tools busy. This would help the war effort, help keep the tools working but ready for emergencies and keep competent men where they can "do their bit" and still be on their regular jobs of speedy repairing of invaluable generating facilities. A few utilities did take on such war work several months ago, others perhaps were reticent about the matter, but certainly those which, as one municipal reported recently, are eager should not be given the run-around by one bureau while another branch tries to entice the machine tool equipment away from the power plant.

OPA May Intervene But Not Regulate

UNDER THE TERMS of the anti-inflation bill passed earlier this month utility rate regulation remains within the normal regulatory jurisdiction. The President has to be advised 30 days in advance of a rise and OPA must be permitted to intervene, but the decision is where it always has been.

Congress is to be commended for refusing to give the President, which is the same thing as saying OPA, veto power over commission grants of rate increases. There won't be many of them, but any that are given will be necessary.

Newly formed war agencies have their hands full in trying to regulate economic conditions in fields formerly without regulation. To try to substitute their opinion for that of a regulatory body that has background and knowledge of conditions is not sound.

There can be no disagreement on the basis that utilities must do their share to help maintain ceilings. And like all others they must pay their share of their net into the government treasury. On the other hand, they furnish a most essential service, and for that reason they should be assured enough income to permit them to maintain this service.

In the original price control bill utilities were specifically omitted because regulation provided a satisfactory control. Nothing has happened to change that except that one utility had a contract with a city which all these years had operated in favor of the city. The first time it went the other way Senator Norris rushed up a bill.

Commission regulation mostly favors the public, as it should, but when needed, relief is given to companies. The Norris concept of regulation, on the other hand, appears to be of the ratchet type—operates only one way.

Washington Comment

GEORGE E. DOYING, Jr., Washington Correspondent

Manpower Problem Coming Up

DISTRIBUTION of materials to get balanced production is today's No. 1 war problem, but tomorrow's will be manpower, which is likely to have worse repercussions.

It is true that Washington has not yet really met, head-on, the question of determining the most effective ratio of men on the fighting fronts to those on the production front. But it is equally important to realize that the military services are now taking men at a rate which will meet the talk of having 13 million men in uniform within another 18 months, or less.

Creation of an armed force of this magnitude means that nearly every man between the ages of 18 and 45 who can pass the Army physical examination will be in uniform by the spring of 1944. This premise is based upon the arithmetic of the situation—there are about 27½ million men within the 18-45 age bracket and draft experience indicates that 13½-14 million of these will be found "able-bodied." The margin between the men available for service and the 13-million figure is thus something short of a million, plus another million resulting from the 1943 class of 18-year-olds. Under this policy, then, the criteria determining who goes and who doesn't necessarily will be the physical examination except for not over two million men with the most irreplaceable technical and professional skills.

Way the Draft Looks

The rate of inductions and enlistments may be decreased, but there is nothing tangible on the horizon at this time to indicate that it will be. In the absence of any contrary determination regarding manpower allocation, the military services are proceeding on the theory that this country can't play seven games on the same Saturday with only three teams.

That's how the draft shapes up from an over-all aggregate! The order in which men, by classes, will be called into service has not changed materially; the change is a speeding up and enlargement of the objectives. Where, for instance, last spring (ELECTRICAL WORLD, May 2, 1942, page 60), when the 3-B class was established for men with dependents working in industries essential to or in support of the war effort it appeared that these men might never be drafted, at the present pace some of them will certainly be called, beginning within a few months.

More Deferment Difficulties

Selective service is now in the transition period from single to married men. Those classified 3-A (that is, working in industries not certified as essential) and without children will go first, then those without children who are classified 3-B. Fathers of one child in 3-A will follow, beginning probably in the second half of 1943, then those in 3-B, and so on down the list.

Occupational deferment is still in the picture, of course, and it will remain a definite part of the selective service procedure as a vehicle for cushioning the drain of manpower upon industry, providing time for employers to train replacements in orderly fashion. This has been strengthened by the recent joint Army-Navy policy to refuse enlistments and commissions to workers in essential industries without consent of employers in an effort to avoid disruptions to vital operations resulting from decisions by employees to anticipate the draft (ELECTRICAL WORLD, September 19, 1942, page 73). Utilities, by virtue of their classification as an essential industry in support of the war effort, will benefit from both these policies.

Occupational deferment, however, is becoming harder to get; the chances of more than one deferment are diminishing for many types of work, and there is no certainty that even initial deferment will be for the maximum period of six months. Draft boards inevitably will consider a shorter time necessary for training replacements than employers will.

This strictness is not only inevitable but also will become essential when—as it will soon—all voluntary enlistment is halted. Such a step will increase materially the requirement for obtaining skilled and technical men through selective service as well as men to carry guns.

The whole occupational deferment system may be overhauled—shifted from an individual to a plant basis, as the draining of manpower becomes more and more severe. Selective Service already is testing out a procedure known as the "manning table" for determining on a plant basis the number of men of different skills necessary to keep the plant going. Data are then plotted showing how fast men can be taken from the plant, how fast replacements can be trained, etc. Thus, in a shop which has a dozen machinists, five of them subject to draft call, but which needs only ten, no deferment, would be allowed for the first two and a schedule would be worked out to take the third man in perhaps six months, the fourth in eight, the fifth in ten.

Congressional Debate Coming

This procedure at present is only in the study stage at Selective Service. It may or may not be adopted—the chances probably are tied up with the future development of over-all manpower allocation legislation.

The future of manpower allocation is not nearly so well defined now as is the future of the draft and its drain upon industry. The most certain thing is that the subject will be the next major issue before Congress. The big debate is whether the War Manpower Commission or Selective Service should do the allocating.

Manpower allocation, however, does not necessarily affect either the size or the rate of expansion of the military forces. It can only if the authority is broad enough to include allocation to the military.

NEWS OF THE WEEK

WPB Tightens Control Over Materials, Inventory

Revised order P-46 cuts deliveries, withdrawals and inventories of transmission and distribution materials 40 percent; 75 percent must come from other utilities inventory

A completely revised priorities order P-46 for utility repair and maintenance has been issued by WPB's power division and is now in effect. The new order provides markedly higher ratings with which to obtain necessary materials and it tightens up WPB controls over the permitted volume of materials which may be used and the amount of inventory.

Materials Cut 40%

One of the most important features of the new order is the revision of Paragraph F to limit deliveries, withdrawals and inventories of transmission and distribution materials to 60 percent of the 1940 base, and to require that not less than 75 percent of the permitted amount of these materials be obtained from the inventories of other utilities. The provision means that only 15 percent of the 1940 volume of transmission and distribution materials may come from suppliers. It was inserted to bring P-46 within the limits of a sharply reduced "stockpile" of new raw materials allocated by WPB's Requirements Committee for utility maintenance.

Effect of the 60 percent limitation for this class of materials upon operations is expected to be slight, inasmuch as other WPB orders restricting extensions already have sharply reduced use of copper, steel, etc., for these purposes. Effect of the requirement that at least three-fourths of the reduced amount be obtained from other utilities, however, is expected to accelerate moves for within-the-industry pooling and trading of stocks on hand.

Paralleling this new control is a provision (paragraph F-4 (vi)) which has the effect of withdrawing the previous system permitting utilities to offer excess stocks for sale and thus put themselves in a position to replenish depleted stocks of short items. This new section permits utilities to replenish stocks of materials sold to other utilities or industry under Priorities Regulation 13, but only to the extent that such actual sales reduce the utility's inventory below the P-46 level.

Another step in the drive to put all idle inventories and plant equipment to work is another new provision, F-4 (vii), authorizing use in excess of normal withdrawal limits of salvaged materials in any quarter equal to the amount of usable material of the same class salvaged from plant in the same period.

Basic rating in the new order is AA-5, lowest of the new double-A series of priority ratings, but several steps higher than the A-2 and A-5 basic ratings previously effective. In place of the A-1-c of the old order for breakdown and precaution against breakdown, the new order grants an AA-2X which may be applied to as much as 30 percent of a utility's purchases. This AA-2X rating cannot be "wiped out" by the normal processes of inflation by too many higher ratings; it is a special rating applicable for essential industrial maintenance and a segregated allocation of material equal to the permitted volume of ratings has been established by WPB.

The new order incorporates all the amendments and interpretations which have been issued since the last version of P-46, at the end of June, in addition to numerous other changes designed to clarify in light of working experience. Among other new provisions is one reducing the permitted delivery and withdrawal of household meters to 60 percent of the 1940 condemnations, plus those needed for new customers. Previously, the 1940 rate of condemnation had been permitted.

WINNING SLOGAN—"V Depends on Me" is the war workers' slogan for which an inspector, John T. Nevitt, Jr., receives from C. S. Redding, president of Leeds & Northrup Co., the first-prize war bond in a production-slogan contest for employees. The contest was one of the activities of the company's joint labor-management committee

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PRP Forms Mailed

Production Requirements plan application forms for the first quarter of 1943 are now being mailed, for return to WPB by October 25. All manufacturers using $5,000 or more worth of metals in a three-month period, with few exceptions, now obtain their priority ratings under this system.

In issuing the first-quarter, 1943,

forms, WPB hinted at changes in the system which probably will incorporate some sort of a "warrant rating" plan geared to end products. "Only if every manufacturer fills out and returns his PD-25A promptly can the improved plans be made effective at an early date," said Ernest Kanzler, director general of operations.

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Government Wants A.C. Equipment

WPB is asking stores and large commercial establishments in a number of areas to sell their air-conditioning equipment to the government for installation in war plants requiring controlled temperatures for production.

Three Washington, D. C., stores, including the newest and largest Sears, Roebuck & Co. store, already have been asked by WPB's conservation division to surrender their equipment. Consideration is being given to removal of equipment from some of the government buildings as well—WPB Chairman Donald Nelson has recommended removal of equipment from the Social Security Building, WPB headquarters.

"We don't know precisely how much equipment will be needed by war plants," Lessing J. Rosenwald, WPB's conservation division chief, said, "but the quantity is enormous."

WPB has halted production of new air-conditioning machinery.

Would Exempt New Public Power Groups From Taxes

Amendment to the Senate's 1942 tax bill provides tax-free status to new municipal ownership corporations formed to take over utilities forced on auction block by SEC orders

A last minute amendment to the Senate version of the 1942 tax bill provides a new avenue by which public power advocates can promote municipal ownership of utilities forced on the auction block by Holding Company Act disintegration orders.

The new provision, sponsored by Senator La Follette, Wisconsin progressive, and accepted by the finance committee, exempts from federal corporate taxes private corporations established by local citizens on non-profit basis to acquire and operate utility properties.

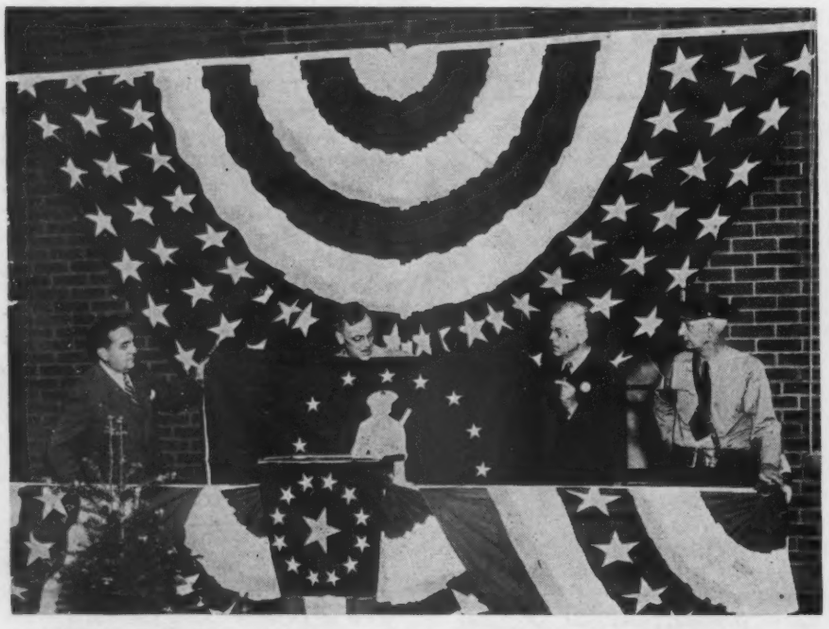
How Amendment Works

By indirect legislation, the amendment sets up machinery for creation of such corporations. It provides that tax exemption shall be granted where the Commissioner of Internal Revenue determines that the corporation was set up in response to a petition signed by 10 percent of the qualified electors (up to 10,000 names), that the officers and directors are qualified voters and a majority of them office-holders, that operations are on a non-profit basis with income used to retire outstanding debt, and that the corporation intends to (and finally does) turn over the debt-free properties to the municipality, state or federal government. Failure to comply with the provisions would reinstate all tax liabilities which would have accrued to a private corporation.

"The purpose of the amendment is to provide tax exemptions for non-profit organizations acquiring utility properties, either as a result of disintegration orders issued by the Securities and Exchange Commission, or otherwise," Senator La Follette said.

Senator Clark of Missouri added the comment that the amendment "will not only have the very great effect of permitting many municipalities or power districts ultimately to be able to acquire these properties and to furnish service to the public at cost, but will also be of tremendous assistance in carrying out the disintegration orders of the SEC as to holding companies, because at the present time the SEC is ordering a great many holding companies to divest themselves of smaller utilities, and such orders cannot be carried into effect because the holding companies have been unable to find purchasers."

Only opposition to the amendment came from Senator Taft of Ohio, who said he was opposed to it because "if a state does not see fit to give one of its municipalities the power to purchase a public utility and issue revenue bonds for it, I do not see why we should step in and provide a method by which the citizens of that community would be able to form a corporation to evade the state law. I cannot see the reason for our assisting a municipality to buy something which it is not permitted by the state law to buy."



FORT WAYNE MINUTE MAN—Shown at the raising of the minute man flag over the Indiana Service Co. offices in mid-September are (left to right) W. Marshall Dale, president of the company; Merle J. Abbott, Allen County bond sales committee; Fred Schmidt, company railway cashier with 45 years of service, and W. J. Bailey, age 76, oldest employee of the company

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EHFA Ordered Disbanded

A Presidential executive order ended this week the life of the Electric Home and Farm Authority, Federal agency established in 1935 to finance the distribution and sale of electric and gas appliances, primarily in rural areas. Production of appliances has been so restricted by the war that this financing is no longer needed. Remaining functions of the agency are being turned over to the RFC for liquidation.

Would Cheapen Cost of Power to War Plants

In letter to war agencies, President Roosevelt "suggests" contract between war plant and power supplier and "common carrier" system of transmission where necessary — Would ban power resales

President Roosevelt has "suggested" to war agencies that electric power for war plants and establishments must be supplied from the cheapest source, consistent with war requirements, and has proposed a "common carrier" system of transmitting energy where necessary to achieve dollar savings.

The proposal has been submitted in letters to Secretary of War Stimson, Secretary of the Navy Knox, WPB Chairman Nelson, Maritime Commission Chairman Land and Federal Loan Administrator Jones. The President has asked the Federal Power Commission to effectuate the policy by using its emergency powers under the Federal Power Act to make available the necessary transmission and other services.

Affects FPC-WPB Treaty

The President's letter has aroused considerable opposition and at least some of the agencies to which the policy has been submitted are planning to urge reconsideration. If put into operation the plan would revoke at least a portion of the April 30, 1942, "treaty" between FPC and WPB which gave the latter full jurisdiction over "mobilization of power to meet specific war production requirements, including the working out of arrangements for power supply to specific establishments and war industries." Mr. Roosevelt approved the FPC-WPB agreement when it was issued (ELECTRICAL WORLD, May 2).

The President's letter makes it clear that what he is proposing is a direct contract between the war plant and the power supplier, with the latter paying transmission tolls for use of lines it doesn't have to reach the customer, instead of wholesale sales of power for resale by the utility serving the area in which a plant is located. Companies with insufficient energy to serve a war load should not, the letter says, be permitted to buy power from neighboring public power agencies and sell it at a substantial profit.

FPC would enter the picture to order the necessary transmission of energy under its section 202 authority and to fix, where necessary, reasonable transmission tolls. This practice, the letter states, would not discriminate in favor of public or private power, but instead would accord with sound business practice.

It is understood in Washington that the policy was proposed to the President by Secretary Ickes. There are several instances in the Northwest where the Bonneville Power Administration is competing with utilities for war power contracts in areas served by private companies.

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Utilities Advised to Retire Debt

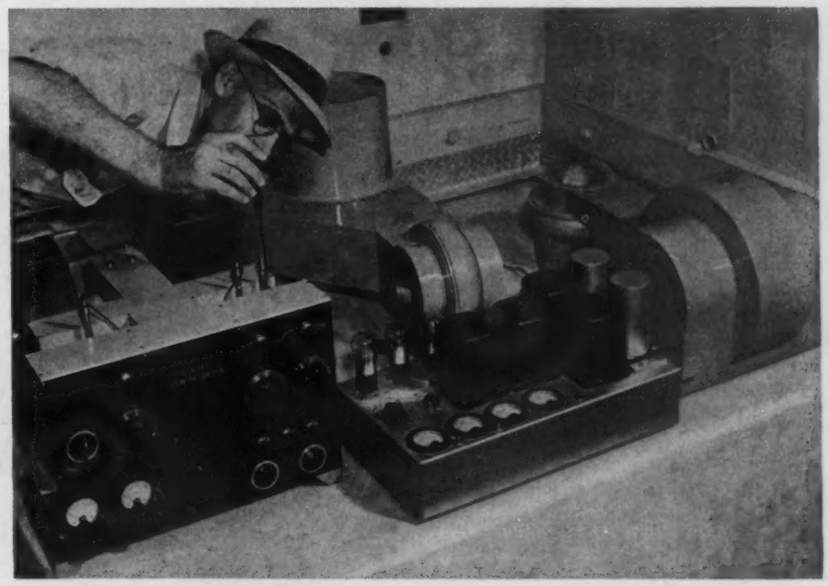
Operating public utility companies can finance war expansion by "tax savings," resulting from speeding up amortization and other internal fiscal methods, it was suggested last week by Robert H. O'Brien, member of the Securities and Exchange Commission, in an address before the American Life Convention's financial section, meeting at Chicago.

Where companies having been restricted by WPB on new construction work, Mr. O'Brien said, they would be wise to devote the income normally available for such purposes, to the reduction of debt, the elimination of preferred stocks, or accumulate cash resources in the form of government bonds to meet the estimated requirements of the postwar period.

Referring to Section 124 of the Internal Revenue Code, which allows companies to amortize their investments in wartime facilities over a five-year period and thus reduces their taxable income, Mr. O'Brien warned companies against paying out in dividends the tax savings resulting from their accelerated amortization deductions.

"Such a policy," the SEC commissioner said, "particularly if accompanied by debt-financing, would be an invitation to trouble and perhaps distress by the enterprise. To a large extent, the gains in present 'net income' as a result of accelerated amortization during the five-year period may be considered illusory, since they will be offset to a considerable extent—depending on tax rates and other factors at the time—by correspondingly greater taxes subsequent to the five-year period."

Utilities with an excessive amount of debt, the speaker continued, should use available cash to reduce their debt, even though the reduction of the debt eliminates a tax deduction for interest charges. Unless debt is reduced, he said, or an equally acceptable alternative adopted, bondholders will find their position deteriorating. In normal times, the use of depreciation and other internal funds for capital expansion results in the maintenance of asset coverage for the bonds and offsets the depreciation of the existing plant and equipment.



GRAND COULEE SEISMOGRAPH—One of the most precise seismographs in the country, according to the U. S. Bureau of Reclamation, is installed at Grand Coulee Dam. Similar ones, capable of magnifying earth movements 100,000 times, are installed at Shasta and Boulder dams. At Boulder structure fluctuations in the weight of the water stored in the reservoir causes many small tremors. D. S. Carder, head of the Lake Mead seismological party, is shown adjusting one of the units

Plead Relief for Nation's Servicing Organizations

Unless they are helped on service price ceilings, labor supply and inventories, an estimated 50 percent of appliance servicing firms will be out of business by end of 1943, Senate Small Business Committee is told

A four-point program, touching upon service and repair charges, labor supply, dealer obligations and inventories, for assisting radio and electric appliance dealers and servicing organizations to keep the nation's electric appliances in working condition during wartime, was presented last week to the Senate Small Business Committee by the Electric Institute of Washington.

Despite the essential service these agencies are performing in the war economy, Managing Director J. S. Bartlett told the committee that unless prompt relief is forthcoming to make possible continuance of repair and service work at a profit, an estimated 50 percent of the firms now in business will be forced to shut their doors by the end of 1943.

Appliance Role Outlined

Mr. Bartlett pointed out that 300 million housewife-hours are saved each week through use of electrical appliances in the nation's homes—the equivalent of one 7½-hour day each week for 40 million women, much of which is devoted to war work, Red Cross assistance and civilian defense operations. In addition to this time saved is the role electrical appliances play in maintaining health through proper food preservation, conservation of vitamins and minerals in cooking and better living conditions by home laundry and cleaning equipment. Equally important is the part these service agencies play in keeping commercial and industrial electrical equipment in war plant and essential civilian establishments in proper working condition, Mr. Bartlett told the committee.

The institute's presentation pointed out that most of this work is done by small-business organizations, the majority of whom now are facing loss of what has been the greater part of their operations.

"Former sources of profits to the servicing and repair business have been eliminated because no more electric appliances are available for sale, and a major part of other electrical apparatus and equipment has been put under strict priority regulations," the presentation pointed out. "During former days much of the repair and maintenance work was carried as a service incidental to the sale of new devices. Owners of appliances have been accustomed to paying repair charges more nearly in proportion to the cost of new equipment than based upon the actual cost of the work to the repair agency."

Subsidies an Alternative

The fact that price ceilings now prohibit putting repair charges on a realistic basis led the institute to suggest to the committee that while the electrical industry is very definitely not in favor of price subsidies as such, "a subsidy would appear to be the only alternative to relief under existing price ceilings, if this important servicing and repair work is to continue."

To relieve the shortage of labor, the institute proposed legislation making available federal aid for training of repairmen and suggested that facilities be provided for training injured men who are being returned from active service in the armed forces. Such a program, the institute contended, would aid in recuperation of the men and fit them for a definite useful career.

Touching upon the need for repair agencies to cut down on overhead as their business contracts, the institute proposed legislation authorizing adjustment of lease obligations where necessary, extension of rent control to commercial occupancies, and establishment of an orderly procedure for liquidating those concerns which must quit.

In the field of inventories, the presentation recommended modification of present regulations limiting dealers' and distributors' stocks to exclude merchandise frozen as a result of government regulation or under strict priorities so that stocks in other lines could be replenished to provide a satisfactory working inventory for an enlarged scale of repair operations. Order L-73 now limits such inventories while making no provision for expansion of that portion of inventory needed in an expanding field.

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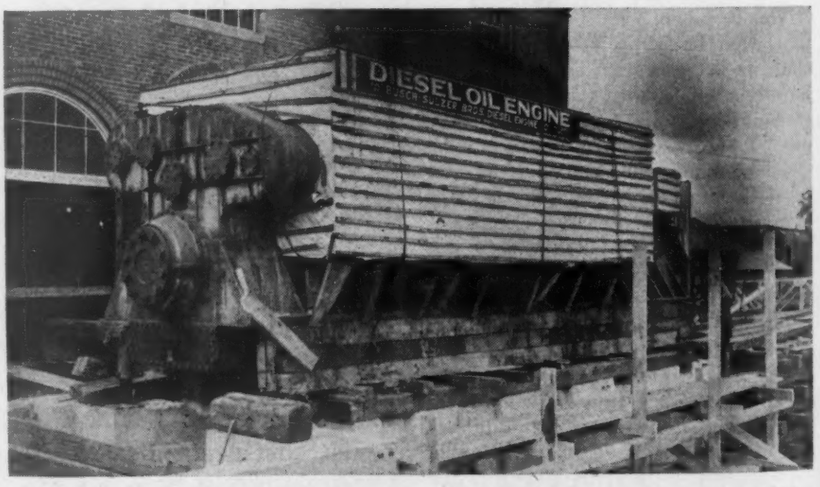
Supreme Court to Review Utility Cases

The Supreme Court this week agreed to hear arguments in two utility cases involving the broad question of what is transmission of energy under the Federal Power Act. The court accepted the appeal of Jersey Central Power & Light Co. from a Third Circuit Court decision holding that the company is subject to FPC jurisdiction because it sells energy to another company which sends power across state lines.

The cases arose when the FPC claimed the right to approve or disapprove the acquisition by New Jersey Power & Light Co. of 341,350 shares of Jersey Central stock. Involved in the cases is the scope of Section 201 of the Federal Power Act relating to transmission of power.

In another action this week FPC won a victory, establishing its right to specify the form of accounting charge-offs for charges disallowed in fixing the original cost of licensed hydro projects by the



MOVING DAY—Hudson (Mass.) Light & Power Department places a new 3,000-hp. Busch-Sulzer diesel engine upon its foundation, to drive a 2,100-kw. Westinghouse generator and increase the plant capacity 60 percent to handle diversified war plant and other loads

high court's refusal to hear an appeal from Alabama Power Co. The case involves FPC's disallowance of $3,600,000 of costs in the Mitchell Dam project and its order directing that the disallowance be charged to earned surplus. Two other Alabama license cases have been similarly disposed of since the Mitchell Dam order and the recent FPC action in the Niagara Falls Power Co. case has similar features.

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Utilities Get Toll Call Priorities

Utilities are among the agencies authorized to use the system of toll telephone call priorities set up by the Board of War Communications to become effective November 1.

Three classes of urgency for long-distance calls are established by the order: (1) Calls requiring immediate completion for war purposes or to safeguard life or property which relate to moving armed forces, extremely urgent orders to armed forces, immediate dangers due to enemy presence or hurricanes, floods, earthquakes and other disasters affecting materially the war effort or public security; (2) other calls requiring immediate completion for national security, successful conduct of war or to safeguard life or property; (3) calls requiring prompt completion for national security, successful conduct of the war or to safeguard life and property which involve important government functions, equipment or materials for war plants, production of essential supplies, supply or movement of food and civilian defense or public health and safety.

Calls in the No. 1 priority bracket interrupt, if necessary, any other conversations except others with the same urgency. The two other classes are to be given preference in completion over non-rated calls.

The phone system is directed to keep permanent records of all priority calls and to make periodic reports to WCB showing the number of priority calls, conversations interrupted, and identity of the person obtaining the priority.

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Denison Dam Contract

C. F. Lytle Co., which has its southwestern headquarters in Denison, Tex., has been awarded the contract for the construction of the power plant at the new Denison Dam on the Red River on a low bid of $2,401,431, which it submitted to the Denison District Army Engineers. The Lytle company built the outlet works and is now paving the spillway for the $50,000,000 dam.

Niagara Hudson Asks Dismissal of SEC Order

Formal answer filed to commission's order on corporate simplification challenges commission's jurisdiction and denies the company is a subsidiary of United Corporation

The Niagara Hudson Power Corp., subject to corporate simplification proceedings under Section 11(b)(2) of the Holding Company Act, in a Securities and Exchange Commission order of August 28 (ELECTRICAL WORLD, September 5, page 73), filed a formal answer to the allegations recently, challenging the jurisdiction of the commission over the Niagara Hudson system. The answer expressly denied that the company, by virtue of United Corp.'s 23.2 percent voting stock interest, was a subsidiary of the latter company and cast doubt on the legal right of the SEC to make the determinations in its order on constitutional grounds. Dismissal of the SEC order was asked in the petition.

War Emergency Cited

As a separate defense, apart from specific allegations which were denied or answered in detail, the respondent companies asserted that the carrying out of the commission's order "would be impracticable and an abuse of discretion, arbitary and capricious." Action by the commission during the present emergency would be "contrary to the public interest," the brief said, and damaging to investors and consumers.

The effect of the commission's order on the respondent companies, from the standpoint of the war emergency, was described as follows:

"The operating properties of respondent companies which comprise the Niagara Hudson system are being utilized to their maximum practicable combined efficiency in the supply of electricity and gas to vital war industries as well as to their regular customers. . . . A supply of electric energy in amounts sufficient to meet the wartime demand in the area served by the Niagara Hudson system companies has been possible only by the interconnection of the generating plants, transmission lines and distribution facilities of the respondents under their coordinated management. . . ."

On the subject of the company's alleged subsidiary status in the United Corp. holding company system the brief declared:

"Neither Niagara Hudson Power Corp. nor any of its subsidiary companies is controlled, directly or indirectly, by the United Corporation . . . by any means or device whatsoever . . . so as to make it necessary or appropriate in the public interest, or for the protection of investors or consumers, that either Niagara Hudson Corp. or any of its subsidiaries be subject to the obligations, duties and liabilities imposed in the act upon subsidiary companies of holding companies."

Pointing out that the commission has recommended the dissolution of United Corp., and that United had an application before the commission under which Niagara Hudson Power Corp. and its subsidiaries would cease to be subsidiaries of United, the brief asserted that with dissolution of the United Corp. the purposes of the act would be effected with respect to the respondent companies.

A hearing, which will be reported upon in these pages in an early issue, was scheduled by the SEC for October 15 consolidating the proceedings concerning the Niagara Hudson Power Corp. and its subsidiary, Buffalo, Niagara & Eastern Power Corp. and subsidiaries. The two companies have filed applications with the commission for orders exempting them from the provisions of the Holding Company Act.

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Planning Second Year Utility Advertising

Progress of the electric company advertising program to date and preparations for its continuation in 1943 were discussed by a group of 80 utility executives at a two-day meeting in Chicago early this week.

While detailed plans for the 1943 program were not available at the time of the meeting, it was understood that they will be announced within the next 30 days. It appeared evident, however, that an extension of the effort in terms of contributors and the number of media may be anticipated.

As the program approaches the end of its first year on December 1, 1942, there are 98 companies participating, it was revealed by E. R. Dunning, vice-president of N. W. Ayer & Sons, the advertising agency handling the campaign. The Chicago meeting at the Palmer House was marked by enthusiastic comments on the effect of the program to date by representatives of participating companies.

Engineers' Pleas for Rehearing Denied

The Securities and Exchange Commission last week denied a request by the Engineers Public Service Co. for a rehearing on its order of September 16 requiring Engineers to dispose of eight subsidiaries and reduce its system to the electric business of either Virginia Electric & Power Co. or the Gulf States Utilities Co. (ELECTRICAL WORLD, September 26, page 9). The commission held that Engineers had failed to substantiate claims for the retention of the utility systems of Gulf States and/or El Paso Electric Co. as additional systems to that of Virginia Electric & Power. The commission, however, extended until October 21 the time for Engineers to file a petition for retention of Gulf States in place of Virginia, which the commission named as Engineers' principal system in their order.

The likelihood of another court test of constitutionality of Section 11 (b) (1) of the Holding Company Act was seen in the rejection by the commission of a volume marked "Respondent's Proffer of Constitutional Evidence," in the petition of the company for a rehearing. The commission, which had previously rejected the evidence, declared that if Engineers wanted to make a more complete proffer of the evidence to save its rights for the purpose of a judicial review, it had no objection to its doing so. A spokesman for the company, however, said that no action had been taken by the board of directors, at the time of writing, concerning a court test of the section as applied to Engineers Public Service.

The United Gas Improvement Co. is currently appealing a decision of the SEC in the Third Court of Appeals.

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United Fights SEC on Dissolution

The right of the Securities and Exchange Commission to order the dissolution of the United Corp., under the "death sentence" provisions of the Holding Company Act, was disputed by the company in oral argument presented before the commission last week by Richard Joyce Smith, United Counsel. Dissolution of the holding company, Mr. Smith said, was neither required nor authorized under Section 11 (b) (2), the corporate simplification clause of the act. Argument centered upon a brief filed by the public utilities division of the commission, recommending dissolution (ELECTRICAL WORLD, Oct. 3, page 73).

Charging that Congress had not intended that Section 11 should confer the power of dissolution—an argument that is currently being heard in the case of the United Gas Improvement Co.'s court test of the section—Mr. Smith urged the commission to give consideration to the company's plan for voluntary reorganization by divesting itself of the controlling interest in any of its statutory subsidiaries. By eliminating control, all the problems raised by the commission would be solved, he said. United would cease to be a holding company and would become, instead, an investment company.

"We are willing to consider any reasonable method of changing voting rights and recapitalizing this company," Mr. Smith said. "Even if the commission does not like the voluntary reorganization plan, it can accomplish all the necessary results for effectuation of Section 11 (b) (2) short of dissolution."

MEETINGS

Previously Listed

Engineers Council for Professional Development—Annual meeting, Engineering Societies Building, 29 West 39th St., New York, N. Y., October 18. H. H. Henline, secretary, 29 West 39th St., New York, N. Y.

Edison Electric Institute — Electrical equipment committee: Gibson Hotel, Cincinnati, Ohio, October 19-20; transmission and distribution committee, Gibson Hotel, Cincinnati, Ohio, October 19-20. Col. H. S. Bennion, managing director, 420 Lexington Ave., New York, N. Y.

International Association of Electrical Inspectors Southern Section, John Marshall Hotel, Richmond, Va., October 19-21. C. M. Jones, secretary, 307 Trust Company of Georgia Bldg., Atlanta, Ga.

Pacific Coast Electrical Association—Business Development, Administrative Services and Operating Economics sections, Californian Hotel, Fresno, Calif., October 22-23. V. W. Hartley, managing director, 601 West Fifth St., Los Angeles, Calif.

National Electrical Manufacturers Association — Annual meeting, Waldorf-Astoria Hotel, New York, N. Y., October 26-30. W. J. Donald, managing director, 155 East 44th St., New York, N. Y.

National Safety Council—Annual congress, Sherman Hotel, Chicago, Ill., October 27-29. N. H. Dearborn, managing director, 20 North Wacker Drive, Chicago, Ill.

National Association of Railroad and Utilities Commissioners — Annual convention, Baker Hotel, Dallas, Tex., November 10. Ben Smart, secretary, 7411-13 New Post Office Bldg., Washington, D. C.

American Society of Mechanical Engineers—Annual meeting, Astor Hotel, New York, N. Y., November 30-December 4. Ernest Hartford, executive assistant secretary, 29 West 39th St., New York, N. Y.

National Exposition of Power and Mechanical Engineering — Madison Square Garden, New York, N. Y., November 30-December 4.

National Association of Manufacturers—Congress of American Industry, Waldorf-Astoria Hotel, New York, N. Y., November 30-December 4. G. G. Geddis, 14 West 49th St., New York, N. Y.

American Society of Agricultural Engineers—Fall meeting, LaSalle Hotel, Chicago, Ill., December 7-9. Raymond Olney, secretary, St. Joseph, Mich.

American Society of Civil Engineers — Annual meeting, headquarters, New York, N. Y., January 20-22. George T. Seabury, secretary, 33 West 39th St., New York, N. Y.

American Institute of Electrical Engineers — Winter convention, New York, N. Y., January 25-29. H. H. Henline, secretary, 33 West 39th St., New York, N. Y.

Hearing Oct. 27 on American Recap Plan

Hearings on a voluntary plan of recapitalization filed by American Utilities Service Corp. under Section 11 (e) of the Holding Company Act and "death sentence" proceedings instituted at the same time by the Securities and Exchange Commission against the company and its subsidiaries, under Sections 11 (b) (1) and 11 (b) (2), have been consolidated by the commission for review on October 27.

The plan of recapitalization provides that American will amend its articles of incorporation so that its authorized capital stock will be changed to 150,000 shares of new common stock, $20 par value, or a new company will be formed with authorized capital stock sufficient to meet the requirements of the plan. The company also proposes to reclassify its existing 105,000 of 6 percent cumulative preferred stock, $25 par value, into 105,000 shares of new common, $20 par value, so that holders of the new preferred will receive the new common on a share-for share basis. The plan affords no recognition of the 1,112,500 shares of no-par common stock which are held in a voting trust which has sole voting rights in the company. This voting trust would be terminated on consummation of the plan and the present preferred stock would have sole voting rights.

American has four active utility subsidiaries—Minnesota Utilities Co., Northwestern Illinois Utilities, Northwestern Wisconsin Electric Co. and Wisconsin Southern Gas Co. It also has five subsidiaries furnishing telephone and water service in Virginia, West Virginia, Illinois, Florida, Georgia, Missouri and Pennsylvania.

As of December 31, 1941, American Utilities Service Corp.'s capitalization and surplus included $4,700,200 of bonds, $10,000 of notes, $2,625,000 of preferred stock, $2,225,000 of common stock and an earned surplus deficit of $1,811,679. In its order the commission alleges that the company, since its formation in 1934, when it succeeded the Federal Public Service Corp., has never paid dividends on its preferred stock, which now has arrearages totaling $632,158 as of last December 31.

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U. S. Power Line Sought

The government has moved in the federal courts of Kansas and the western district of Missouri to secure possession of the necessary right-of-way for the construction of a high-voltage transmission line from Kansas City, Mo., to an ordnance plant in Kansas.

Week's Output Turns Upward

Reversing the downward trend of the past two weeks, the amount of electrical energy distributed by the light and power industry for the week ended October 10 turned upward, according to figures compiled by the Edison Electric Institute. The figures showed 3,702,299,000 kw.-hr. distributed for the October 10 week, as compared to 3,682,794,000 kw.-hr. the previous week. The percentage change from the corresponding week of last year dipped from 10.6 percent for the week ended October 3 to 10.3 percent for the week ended October 10 of the current year.

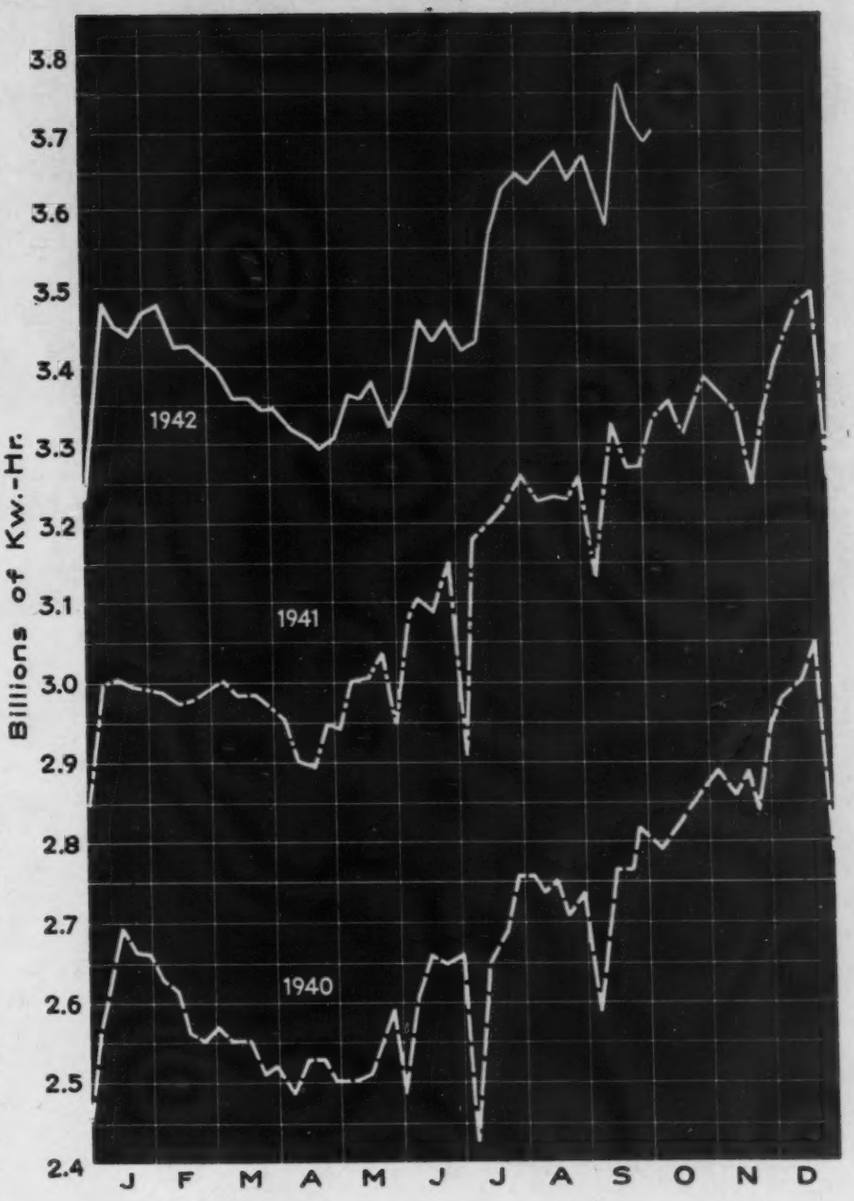
Pacific Coast area held a gain over last year of 30.8 percent. New England states again showed the sharpest decline for the week with only a 1.0 percent gain. Mid-Atlantic states showed the second sharpest decline, reporting a gain of only 2.1 percent over last year, compared with 4.2 percent registered the previous week.

Weekly Output, Millions Kw.-Hr.

1942		1941		1940	
Oct. 10	3,702	Oct. 11	3,355	Oct. 12	2,817
Oct. 3	3,683	Oct. 4	3,330	Oct. 5	2,792
Sept. 26	3,720	Sept. 27	3,273	Sept. 28	2,816
Sept. 19	3,757	Sept. 20	3,273	Sept. 21	2,769
Sept. 12	3,571	Sept. 13	3,322	Sept. 14	2,773
Aug. 29	3,640	Aug. 30	3,261	Aug. 31	2,736
Aug. 22	3,674	Aug. 23	3,231	Aug. 24	2,714
Aug. 15	3,655	Aug. 16	3,238	Aug. 17	2,746
Aug. 8	3,637	Aug. 9	3,323	Aug. 10	2,743
Aug. 1	3,649	Aug. 2	3,263	Aug. 3	2,767

Percent Change from Previous Year

	Week Ending		
	Oct. 10	Oct. 3	Sept. 26
New England	+ 1.0	+ 1.4	+ 6.2
Mid-Atlantic	+ 2.1	+ 4.2	+ 8.2
Central Industrial	+ 6.2	+ 6.3	+ 9.2
West Central	+10.8	+10.2	+19.9
Southern States	+16.6	+15.3	+ 9.9
Rocky Mountain	+ 8.4	+ 9.0	+30.0
Pacific Coast	+30.8	+29.1	+30.0
Total United States	+10.3	+10.6	+13.7



Postcard Meter Reading Results Announced

Results of rural meter reading by use of postcards for the past three months have been announced by officials of the Savannah (Ga.) Electric & Power Co. In June 88 percent of the cards were returned—2 percent with incorrect reading, 19 percent were returned too late to be used, 67 percent used for billing. In July 75 percent were returned —1 percent returned with incorrect reading, 15 percent too late to be used, 59 used for billing. In August 77 percent were returned—1 percent with incorrect reading,, 20 percent too late to be used, 56 percent used for billing.

East Tennessee Light & Power Co., which reported that during July, first full month of the plan, approximately 87 percent of the meter reading cards were returned on time (ELECTRICAL WORLD, September 12, page 20), has announced that during August there was a decrease of 3 percent in returns.

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December Peak Demands

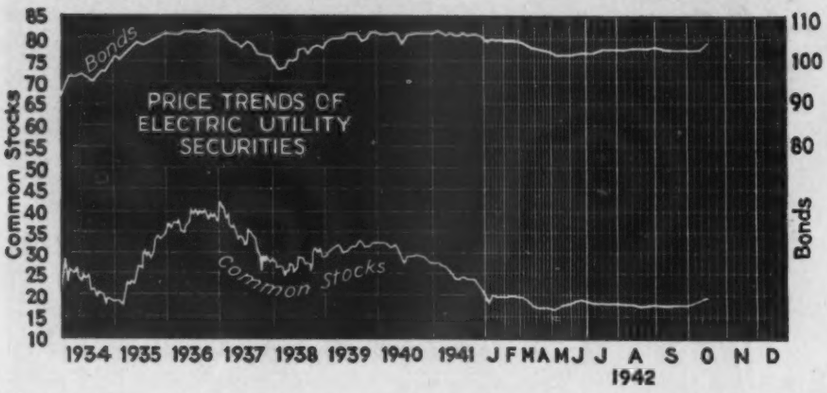
Electric energy requirements of the principal public utility systems of the country during July, 1942, totaled 15,594,062,000 kw.-hr., a gain of 12.7 percent over the same month last year, the Federal Power Commission has announced. Corresponding peak demands aggregated 29,798,134 kw., up 8.1 percent over July a year ago. Utility estimates of peak demands for December, 1942, are reported to amount to 35,973,-430 kw., 13.8 percent more than the sum of peak demands experienced in December, 1941.

Stream Flow Continues Good

Imminent drought conditions have been forestalled by marked stream flow improvement throughout eastern Ontario, Quebec and Nova Scotia, according to the monthly Water Resources Review for September, published jointly by the Geological Survey, U. S. Department of the Interior, and the Power Bureau of the Dominion of Canada.

Ground water conditions are reported generally favorable throughout the United States. The outlook for surface water supplies is good to excellent in both the United States and Canada except in the Pacific Northwest, Arizona, New England and in a fringe along the Atlantic seaboard from southern New Jersey through North Carolina and in New Brunswick and Quebec.

Utility Stocks and Bonds Continue Upward


PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
Bonds
Common Stocks
Common Stocks
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
Bonds
1934 1935 1936 1937 1938 1939 1940 1941 J F M A M J J A S O N D
1942

Electric utility stocks soared again the past week, carrying the "Electrical World" index to 19.4 from 18.6; last year, 23.0. Bonds also improved, advancing to 103.4 from 103.1; last year, 105.8. These are the highest points since last March

U.G.I. Says P.S. of N.J. is an "Investment"

Reaffirming its position that Public Service Corp. of New Jersey represented nothing more than an investment interest, counsel for the United Gas Improvement Co. appeared before the Securities and Exchange Commission last week in the opening of reargument on the motion of U.G.I. to stay the show-cause proceedings before the commission with respect to divestment of the holding company's interest in Public Service.

The commission previously had refused to stay the proceedings (ELECTRICAL WORLD, October 3, page 76) following argument on September 29, but consented to reargument when U.G.I. counsel contended that the ruling was based on the SEC's misconception of the company's position with respect to Public Service Corp. The commission already has ruled that U.G.I.'s 26 percent stock interest in Public Service makes the latter a "subsidiary utility" of the holding company. The commission's ruling was upheld by the Third Circuit Court of Appeals, but, pending final disposition of the matter by the Supreme Court, U.G.I. is seeking to have the proceedings held in abeyance.

Major portion of the reargument, presented by Thomas B. K. Ringe, U.G.I. counsel, was confined to a series of five questions propounded by the commission for the purposes of the new hearing. The questions, characterized by Mr. Ringe as "partly hypothetical, and based partly upon unwarranted conclusions," concerned the possibility of U.G.I.'s proposing to prove or claim any right to retain any interest, direct or indirect, in subsidiary utility properties of Public Service. U.G.I., Mr. Ringe replied, had made no claim to retain physical properties of Public Service and it did not own or control those properties. Discussions have been based, he pointed out, on the premise that Public Service is a corporate entity and that if that basis was changed U.G.I. would reserve the right to reconsider its position.

"It is sufficient to state at this time," Mr. Ringe said, "that until the commission has finally and definitely determined what the single, integrated public utility system and additional systems of U.G.I. are, neither U.G.I. nor the commission is able to state with the necessary precision what relation its holdings in Public Service Corp. of New Jersey may have to them."

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National Seeking Another Extension

The SEC has set October 12 as the date for a hearing on the application of National Power & Light Co. for an extension to and including December 15 to effect its plan to exchange for each share of National's preferred stock two shares of Houston Lighting & Power Co. common stock. This marks the third extension requested by National to effect the exchanges in compliance with a commission dissolution order. It is understood that only about 36 percent of National's preferred has been offered in exchange to date.

The present exchange offer expired on October 13; previous offers expired on June 16 and August 14. During the life of the latter extension, the company offered an amended program which contemplated the use of three investment banking concerns to be retained as dealer-managers, enlisting the country's security brokers in facilitating the exchanges. Despite the aid of the brokers, exchanges to date have only achieved an increase of from 21 percent to 36 percent of the stock.

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Stock Dividend Credit Adopted

Utilities obtained one important concession in the Senate version of the 1942 war tax bill with the adoption of the finance committee provision making dividends paid on preferred stocks an additional credit in computing corporate income surtax. The surtax is 16 percent in the case of companies with taxable earnings of $50,000 or more and is in addition to the 24 percent normal income levy.

Before final passage of the tax measure, the Senate struck out the words in the preferred stock credit provision, which would have limited the effectiveness of the paragraph only to preferred issues with non-voting rights, a limitation conflicting with policies of the Securities and Exchange Commission. Final wording of the definition of senior stock issues as the measure went to conference covers all "stock issued prior to September 1, 1942, which on October 1, 1942, and during the whole of the taxable year was stock, the dividends in respect of which were cumulative, limited to the same amount, and payable in preference to the payment of dividends on other stock."

On another provision of the bill of interest to utilities the Senate overrode its committee and struck out of the measure the amendment which would have made all future bond issues of state and local governments, including their agencies, such as public utility districts, etc., subject to federal income tax.

Other proposals of the utility industry for tax relief geared to its special problems (ELECTRICAL WORLD, August 22, 1942, page 67) were not included in the revenue bill which the committee sent to the floor.

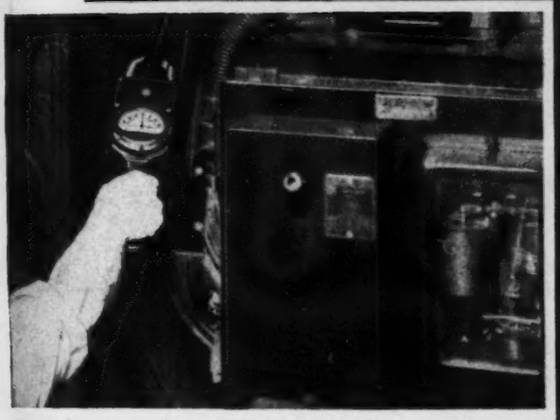
Utility Reports

	Net Income 1942	1941
*American Gas & Electric and subs	$11,467,903	$15,002,301
*Arkansas Power & Light	1,895,946	1,345,114
*Carolina Power & Light	2,507,532	3,586,829
*Central Arizona Lt. & Pwr.	653,469	637,913
*Houston Lighting & Power	2,454,980	3,089,794
*Idaho Power	987,314	1,453,272
*Kansas Gas & Electric	1,203,153	1,587,975
*Mississippi Power & Light	535,031	333,577
*New Orleans Public Serv.	2,264,695	2,649,093
*Northwestern Electric	579,736	502,925
*Pennsylvania Pwr. & Lgt.	4,888,011	8,133,379
*Texas Electric Service	886,460	1,187,100
*Utah Power & Light and subs	1,877,897	1,925,039
*Washington Water Power and sub	2,082,999	2,026,602

*Twelve months ended August 31.

Type AK-1
hook-on volt-ammeter

How These Hook-on Instruments Can Help Keep Production Rolling



The AK-1 is made for tight places. Here it is being used for a quick, easy measurement of voltage-regulator current.

Type CF-1
INKLESS recording ammeter (with split-core current transformer)

Measuring a-c VOLTS and AMPS. Hook it around a conductor to measure amperes. Connect the voltage leads (as shown above) to measure volts. With this one setup, you can make either measurement just by flicking the selector switch.

Checking motor load with the CF-1 recording ammeter and split-core current transformer.

1. The ease of making tests encourages routine testing and promotes good maintenance, which prevents production delays.

2. Emergency tests can be made without cutting conductors—thus avoiding shutdowns.

TODAY, when motors and other electric equipment are being taxed to the limit and may be overloaded, frequent testing of circuit conditions will often avert serious production delays. These instruments will take care of almost all your testing work.

The volt-ammeter is ideal for emergency tests where a fast check of circuit conditions is needed. It measures both VOLTS and AMPERES. Having six a-c ranges, it's really six instruments in one —0-15/60/150/600 amperes and 0-150/600 volts.

The INKLESS feature of the recording ammeter makes it the handiest of recorders for general plant maintenance. With no pen to start and no inkwell to fill, it's ready to be hooked around a conductor and start recording at a moment's notice.

You're overlooking a good bet if you don't have both these handy G-E instruments for emergency and maintenance testing. For complete information on the volt-ammeter, ask for Bulletin GEA-2950; on the recorder, GEA-3187. Your G-E office has copies. General Electric, Schenectady, New York.

GENERAL ELECTRIC

HOW DESIGN . . . CONSTRUCT OPERATE MAINTAIN

Duct Flooding Cools Cable Hot Spots

By R. L. DODD
Assistant Superintendent Electrical Construction
Wisconsin Electric Power Co., Milwaukee

Flooding of ducts with water to reduce hot spot temperatures that limit cable-carrying capacities has been practiced by this company for some time, particularly on a ten-duct conduit run carrying nine 13.8-kv. and 27.6-kv. cables near Lakeside power plant. During the hottest weeks of summer, when the sun's heat adds greatly to cable temperatures, relief has been readily obtained by flooding. Cost of this method of controlling cable hot-spot bottlenecks has been found less than that of other methods. It is effective and no overload cable failures have occurred in the sections where flooding is practiced.

To facilitate temperature supervision in the duct run mentioned a No. 10 copper wire is installed in a vacant center duct through each hot-spot section. During the summer thermocouples are pulled into these hot-spots and temperature readings taken weekly, or oftener if needed. When vacant duct temperature rises above 40 deg. C. before Friday the flooding treatment is ordered.

An underground crew connects 2½-in. fire hose from the nearest hydrants to manholes above each hot-spot. Each manhole is filled above the ducts and the water runs down to the next lower manhole through the lower ducts and through the vacant center duct. It has been found that a full stream of water flowing through the ducts to the next lower manhole for 20 minutes will effect the desired cooling. A few hours after water is shut off it has seeped away completely.

One hot-spot in the duct line mentioned is the crest of two slopes and cannot be reached by gravity flow of water. In this case water is forced up the slope through the vacant center duct. It is allowed to run a full 4-in. diameter stream into the next manhole for 20 minutes.

Tests show that hot-spot daily maximum temperatures usually increase from Sunday to Friday. If 40 deg. C. is recorded on Tuesday, flooding is necessary on Wednesday and Friday. If 40 deg. C. is reached on Wednesday or Thursday, one flooding that week on the following day is sufficient. Some five flooding operations a year have sufficed to keep cables in this conduit below critical temperatures for five years.

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Storage Battery Maintenance Form

By V. D. HOLLIS
Operating Department, Central Illinois
Public Service Company, Springfield

Maintenance of storage batteries which are cared for by a local utility man with other duties has been improved by furnishing the accompanying form on which to record daily readings of bus voltmeter and pilot cell hydrometer. Even though the report is not required to be sent in to the division office, it has served as a

STORAGE BATTERY MONTHLY REPORT
(BATTERY IN FLOATING SERVICE)

DIV. _____

LOCATION _____ MONTH _____ 19__

NUMBER OF CELLS _____ TYPE _____ YEAR INSTALLED _____

DAY	BUS VOLTS	PILOT CELL HYDROMETER READING	CELL	VOLTS	HYDROMETER READING	ELECTROL. TEMP.	CELL	VOLTS	HYDROMETER READING	ELECTROL. TEMP.
			1				31			
1			2				32			
2			3				33			
3			4				34			
29			28				58			
30			29				59			
31			30				60			

CELL VOLTAGE READINGS:
Observe once each month, 10 to 20 minutes after starting, equalizing charge. Read the hundredths as 2.29, 2.32. Use accurate voltmeter. If the difference between the highest reading and the lowest reading is more than .10 volts, take a check set of readings and record in adjacent extra column.
EQUALIZING CHARGE:
Give regularly once each month. One method for 60 cells is to raise bus to 140 volts for 8 to 24 hr. (preferably 24 hours.); then return to 129 volts for float.
CELL HYDROMETER READINGS:
Observe once every three months, 15 minutes to 24 hr. after completing equalizing charge. Record as read - do not correct for temperature.
CELL TEMPERATURE READINGS:
Observe at same time as hydrometer readings but only in 2 or 3 cells in each row.
ADDING WATER:
Add water before starting equalizing charge or after completing hydrometer readings.

DATE WATER ADDED _____ TOTAL QUANTITY _____ QTS.

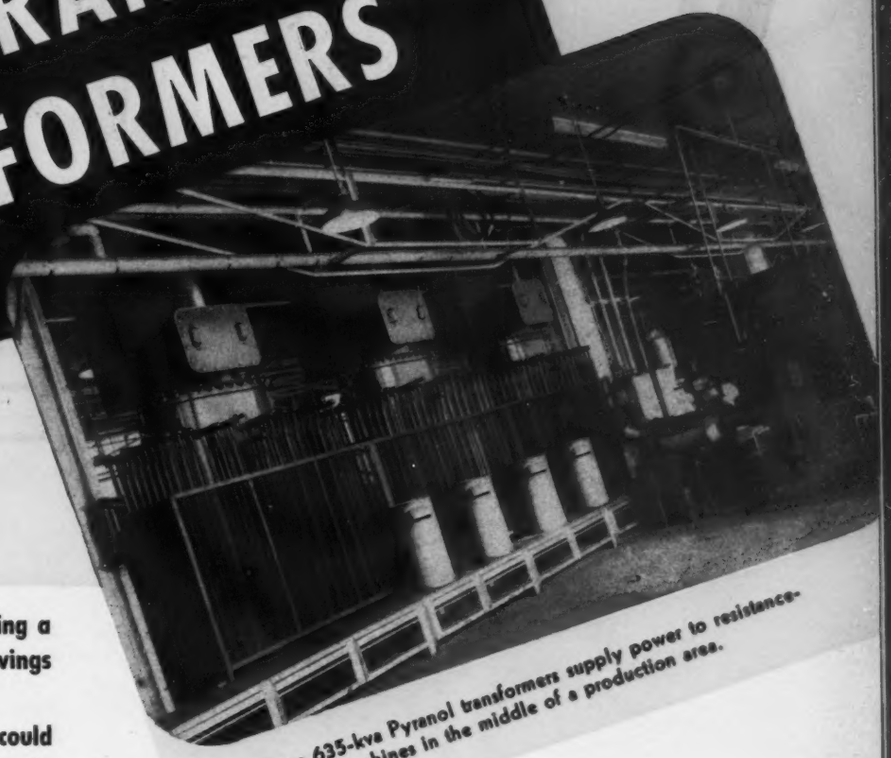
PILOT CELL: NO. _____

REMARKS: _____

_____
Signed

MONTHLY report form covers cell conditions in detail

TO THE HUNDREDS OF NEW USERS OF PYRANOL TRANSFORMERS



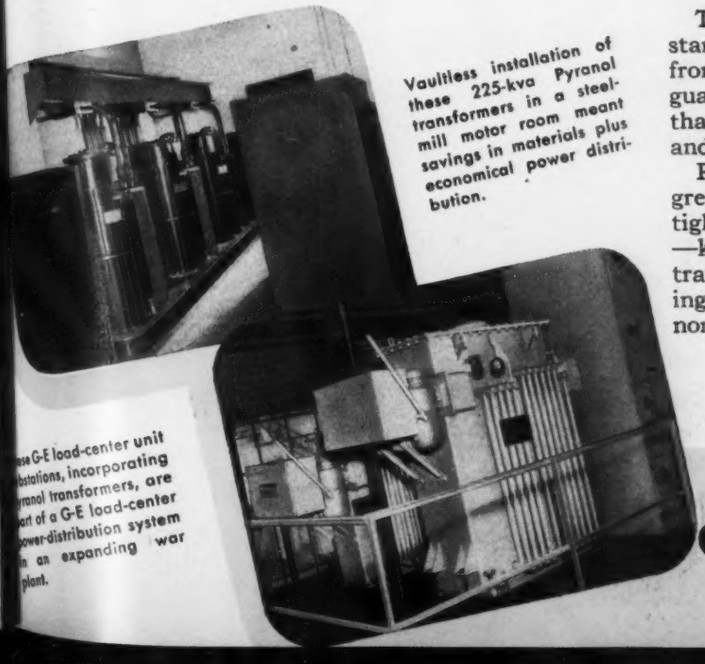
These 635-kva Pyranol transformers supply power to resistance-welding machines in the middle of a production area.

By installing Pyranol transformers (instead of making a conventional transformer installation) you made big savings in materials and over-all installed cost.

You reduced installation time and cost, because you could install these transformers indoors without a fireproof vault.

You saved copper—many tons of it if your plant is a large one—because you could install these transformers right at load centers, where transformers were meant to be installed.

You reduced line losses and voltage drop in your plant circuits and assured better performance from motors, resistance-heating equipment, lamps, and other electric equipment.



Vaultless installation of these 225-kva Pyranol transformers in a steel-mill motor room meant savings in materials plus economical power distribution.

...se G-E load-center unit ...bstations, incorporating ...ranol transformers, are ...art of a G-E load-center ...ower-distribution system ...n an expanding war ...plant.

Safety of Pyranol—an Asset to Your Plant

Since the introduction of Pyranol in 1932, more than 4,000,000 kva of new transformers have been furnished with this type of noninflammable insulating and cooling liquid. No Pyranol transformer, in 10 years of operating experience, has burned or contributed to a fire.

Greater Reliability—a Continuing Benefit

The high dielectric strength of Pyranol means extra stamina to resist damage from voltage surges resulting from switching operations or lightning. This is a safeguard against progressive deterioration of the insulation that might otherwise result in a transformer breakdown and loss of power service.

Pyranol transformers have other features that mean greater reliability and little maintenance. The pressure-tight steel tank protects both liquid and solid insulation—keeps out dust, dirt, moisture, and other enemies of transformer life. Pyranol is nonoxidizing and nonsludging. It will retain its insulating properties over years of normal operation. *General Electric, Schenectady, N. Y.*

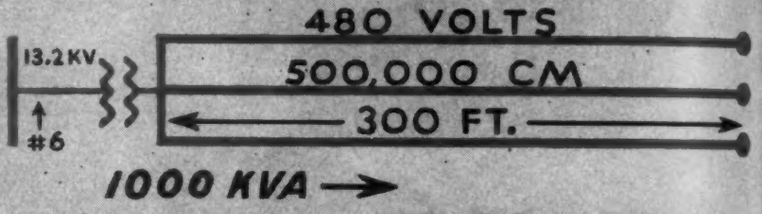
General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL ELECTRIC

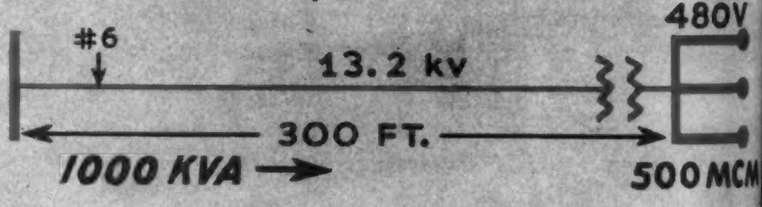
660-61-5300

To Conserve Copper

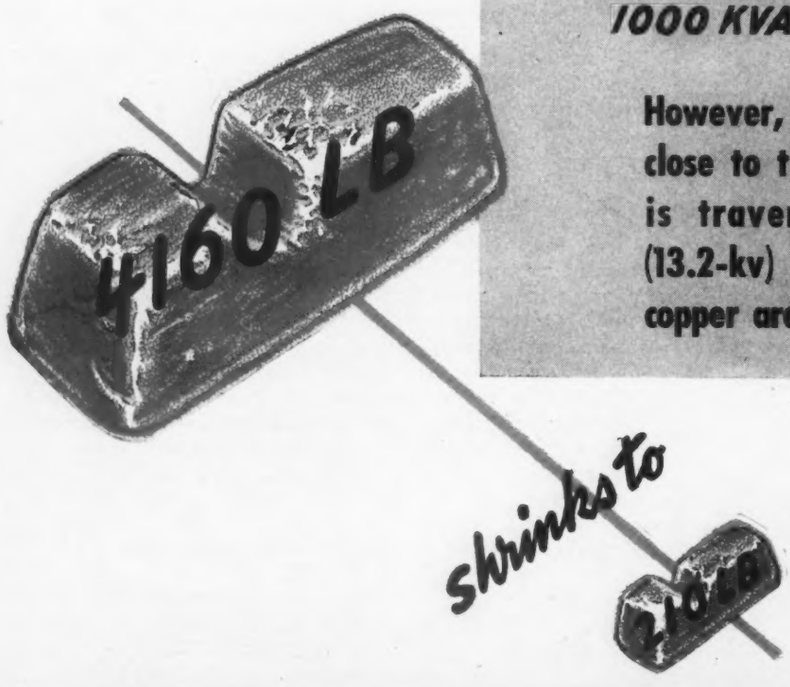
WITH our growing war effort demanding all available copper (and more), stringent conservation of this highly important metal is obviously imperative. War-plant electric systems offer many opportunities for conservation without adversely affecting the systems in any way. . . . . see example. ➔



If 1000 kva is supplied through 300 feet of low-voltage (480-v) feeders, 4160 pounds of copper in cable conductors are required.



However, by moving the substation up close to the load so that the 300 feet is traversed with a high-voltage (13.2-kv) feeder, only 210 pounds of copper are required.



To conserve copper, locate substations as close to the load as possible.

GENERAL ELECTRIC

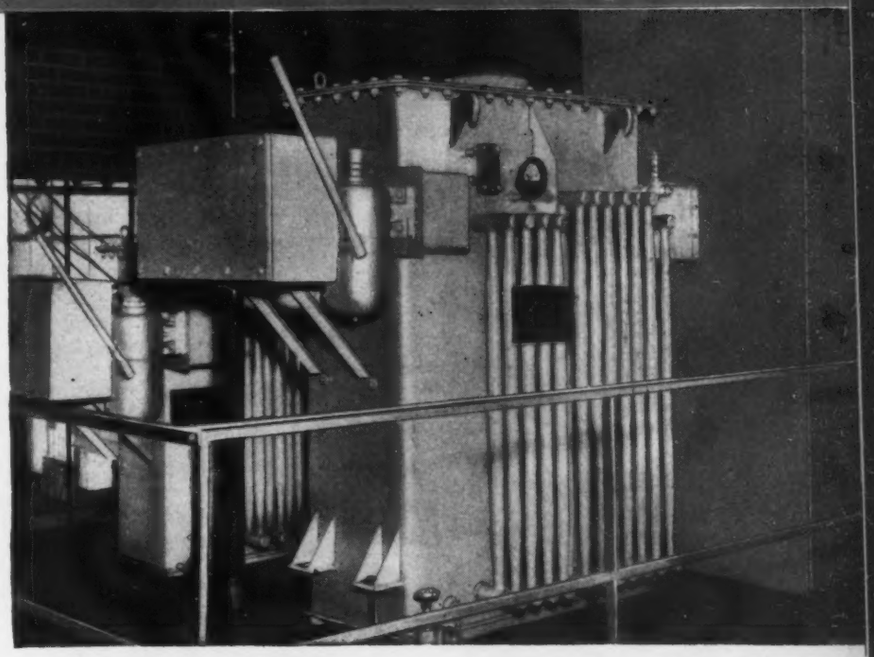
Cover As Much Distance with High-voltage Circuits As Possible

To really do this, you'll use unit substations at load centers — and they'll be small-size units

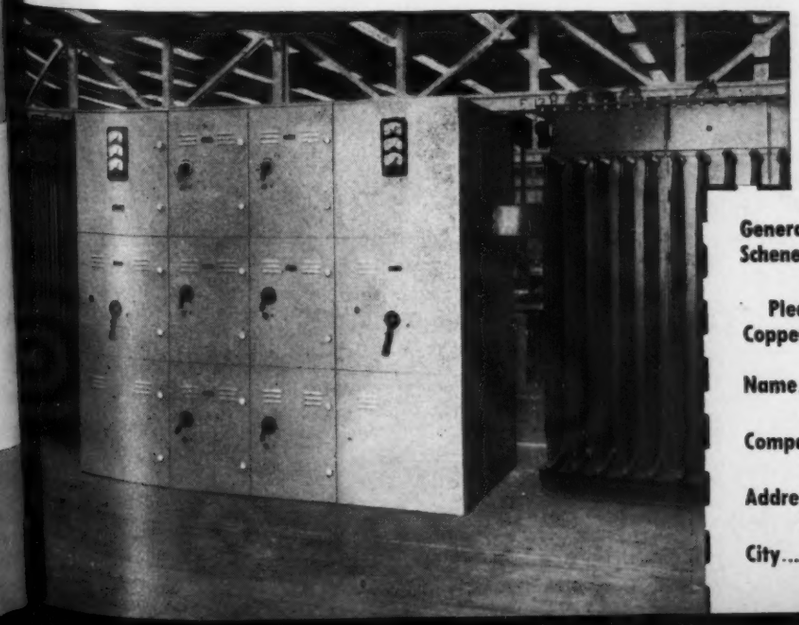
FACTORY-ASSEMBLED unit substations can be quickly installed at load centers right in working areas—with practically no loss of valuable floor space. Installing units at the centers rather than at the sides of load areas requires 30 to 40 per cent *less* copper.

By using four small unit substations rather than one large substation to serve a square load area, you can save one-half the amount of copper required by the latter. Safety-metal-enclosed construction, along with Pyranol (G-E askarel) transformers, precludes the necessity of expensive vault construction.

There are other important ways of conserving copper in electric systems—cable copper, particularly. By distributing power at the highest practical voltage, and by using cable with high-temperature insulation, a considerable amount of copper will be saved. For an analysis of five ways to conserve tons of copper in war-plant electric systems, mail the coupon today.



These compact, "packaged" units require considerably less copper in themselves than old-style substations. They are readily installed over washrooms, along column centers, on sub-balconies, or in other comparatively valueless space. And they can be purchased more easily and quickly than "piecemeal" equipments.



The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in five plants manufacturing naval equipment

General Electric, Sec. H 302-12
Schenectady, N. Y.

Please send me a copy of your bulletin, "Five Ways to Conserve Copper."

Name.....

Company.....

Address.....

City..... State.....

5900 & 1705

daily reminder that the battery must be checked.

The form has concise instructions covering maintenance printed below the table of daily readings. With most operators, emphasis on holding bus volts accurately and maintaining liquid level will greatly prolong the life of the battery. All the other details can be cared for periodically by the division battery specialist.

•

Deflection Chart for Steel Pipe Buses

By WALTER S. SCHEERING
Assistant Design Engineer
Western Massachusetts Companies,
Springfield, Mass.

The supply of copper and aluminum had been plentiful, but it is becoming increasingly difficult to obtain them in tubing forms for use as electrical buses.

This situation has necessitated more frequent consideration of steel pipe as a substitute for copper and aluminum tubing. Tables of current-carrying capacity of steel pipe, as determined from tests by S. C. Killian, were published in the ELECTRICAL WORLD on April 18, 1942, page 67. Since it is equally important to consider deflection in determining the size of steel pipe that would be suitable for a given condition, the accompanying alignment chart has been prepared to relieve the designer of long and laborious calculations.

After determining the minimum size that will satisfy current-carrying requirements, the chart may be used to calculate the maximum span for an allowable deflection. If the span between supports is dictated by conditions of design, the chart may be used to calculate the size of pipe that will be required, in order not to exceed the allowable deflection.

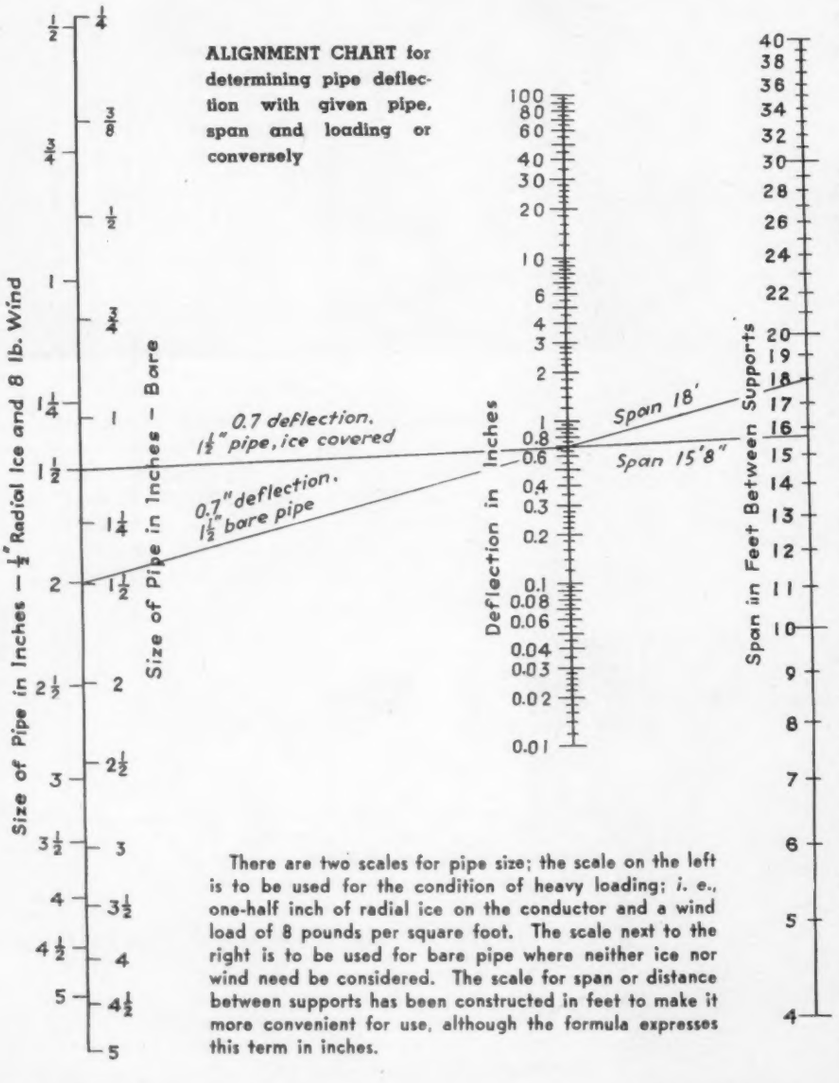
Good practice limits the maximum deflection of the pipe to 1/150 of the span where two supports are used and 1/200 where three or more supports are used. For similar spans and pipe sizes, steel pipe will have approximately one-half the deflection of copper tubing. The modulus of elasticity of steel is nearly twice that of copper, and for a given volume copper is 13 percent heavier than steel.

The chart is based on the formula:

$$D = \frac{5WL^4}{384EI}$$

where D = Deflection in inches
W = Weight per inch of bus
L = Length of span in inches
E = Modulus of elasticity (30,000,000 for steel)
I = Moment of Inertia, $0.049(D^4 - d^4)$ where D and d represent the outside and inside diameter of the pipe, respectively, in inches.

The deflection obtained with this chart is for a single span supported at both ends. If the bus is rigidly clamped at both ends, one-fifth of the value obtained should be used; if continuously supported in two equal spans, but not fixed at each end, two-fifths of the value obtained with the chart should be used.


ALIGNMENT CHART for determining pipe deflection with given pipe, span and loading or conversely
Size of Pipe in Inches — ½" Radial Ice and 8 lb. Wind
Size of Pipe in Inches — Bare
Deflection in Inches
Span in Feet Between Supports
0.7 deflection, 1½" pipe, ice covered
0.7" deflection, 1½" bare pipe
Span 18'
Span 15'8"

There are two scales for pipe size; the scale on the left is to be used for the condition of heavy loading; *i. e.*, one-half inch of radial ice on the conductor and a wind load of 8 pounds per square foot. The scale next to the right is to be used for bare pipe where neither ice nor wind need be considered. The scale for span or distance between supports has been constructed in feet to make it more convenient for use, although the formula expresses this term in inches.

•

Sisal Ropes Tested, Strength and Wear

Japanese occupation of Java and the Philippines has not only cut off almost entirely the supply of manila hemp—principal ropemaking fiber—but also the supply of Java sisal, one of the next best fibers. Available stocks of manila are being conserved for vital Navy and Army requirements. There remain for civilian use sisal from Africa, a little from Haiti and henequen from Mexico.

Since sisal is to be the principal rope-making material for the duration, the following data on breaking strength and wear resistance of sisal compared with manila rope is presented from a recent test on sisal rope made by the general engineering department, Commonwealth & Southern Corporation, Jackson, Mich., during June 1942.

Sixteen points covering the selection, application and care of sisal rope used on utility systems, can be listed:

1. In order to maintain the same safety factor with sisal as with manila rope a larger size should be used. The lower breaking strength of sisal rope as compared with manila (published at 80 percent) should be considered in selecting

How to put MORE LOAD ON A FULLY LOADED SYSTEM

WITHOUT A CHANGE IN SYSTEM LAYOUT

Standard 15-kva capacitor unit

CAPACITORS—your best bet for meeting the power requirements of over-night load growth. By relieving the system of reactive kva and improving power factor, they enable the lines to carry more working current—from 1/3 to 2/3 kva for each kva of capacitors installed. In many cases enough capacity is released to forestall the installation of new feeders.

Other Advantages of Capacitors

INSTALLATION TAKES LITTLE TIME. You merely build up banks of capacitors, and then make the necessary connections. When load centers shift, the capacitors can be moved to new locations. This avoids tying up capital in idle equipment.

COST IS LOW. On many feeders, it is only $7 per kva of capacitors installed.

Ask your G-E representative for a quick estimate of the increase in capacity and of the savings possible with Pyranol* capacitors, or write for descriptive bulletin, GEA-3333. *General Electric, Schenectady, N. Y.*

*Reg. U.S. Pat. Off.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL ELECTRIC

407-34-5700

Table I—Breaking Strength of Sisal Rope

Tests Made at Jackson, Michigan, June, 1942

Make	Source of Sisal	Breaking Strength — Lb. ½	⅝	⅝	¾	1
Published Values	.....	2,120	2,760	3,520	4,320	7,200
A	?	2,545	3,220	.....	4,710	7,970
B	Java	1,970	.....	3,800	.....	.....
C	Java or Africa	2,365	.....	.....	5,290	8,200
D	?	.....	.....	.....	3,980	7,720
E	Africa	1,960	.....	.....	4,040	6,680
F	Java	2,110	.....	.....	4,470	8,030

Table II—Wear Tests

Make	Size	Kind	Breaking Strength — Lb. New	Accelerated Test	Percent Decrease	Remarks
A	½	Sisal	2,545	1,177	54	2,837 cycles, 100-lb. load
B	½	Sisal	1,970	1,045	47	2,837 cycles, 100-lb. load
A	½	Manila	2,860	.....	100	Failed at 2,711 cycles, 100-lb. load
A	½	Manila	2,860	.....	100	Failed at 2,351 cycles, 100-lb. load

the size rope to be used and the maximum load to which the rope shall be subjected.

2. Tests indicate that sisal is at least equal to Manila rope in wear resistance. However, little data and few life tests on sisal rope are available compared with manila rope and caution should be used in applying this new product.

3. Four-strand sisal rope when used for hand lines decreases in strength at a slightly lower rate than three-strand rope.

4. Source of sisal fiber may affect the ultimate strength of the rope. Most rope samples tested were of Java sisal. Rope samples made of African sisal were below the published values of breaking strength for sisal rope.

5. Rope should be stored in a dry, unheated room with a free circulation of air. It should be placed in loose coils off the floor on wooden grating or hung on a wooden peg.

6. Dirty rope should be washed thoroughly in clean water and dried before storing.

7. Improper storage conditions are a common cause of the so-called dry rot.

8. Drying oils such as linseed oil, paint, acids and alkalis are very injurious to rope fibers and will cause severe rope damage.

9. A rope should not chafe another or drag over sharp or rough objects as this will cut or break the outer fibers.

10. Sand, grit or dirt on the rope will work into the rope and rapidly abrade the inner fibers.

11. Blocks and sheaves too small for the rope will increase the wear and friction load.

12. A sharp bend reduces the tensile strength of rope by putting extra strain on the outer fibers.

13. Lubrication should not be added to rope. The lubrication built into the rope is adequate for its entire life.

14. Visual inspection as well as periodic tensile tests should be made on all rope in service.

15. Broken fibers as indicated by ends projecting from the strands are a definite indication of a decrease in the strength of the rope.

16. The fact that manila rope and the better grades of sisal are no longer available makes it imperative that the greatest care be given to present stocks and rope which is now in service.

Breaking Strength

Breaking strength of sisal rope is published at 80 percent of the strength of manila rope. Table I gives the published values of breaking strength of sisal rope, average test results obtained on samples submitted by six manufacturers and the source from which the sisal was obtained.

Wear Resistance

Table II gives data on samples to determine the percent decrease in breaking strength. Results of tests and technical information received indicate that sisal rope would be satisfactory as far as wear from travel over a pulley is concerned. It has been stated, however, that sisal rope does not have as much elastic recovery as manila rope.

Wear tests were conducted by running rope back and forth through a turn of 180 deg. over a pulley which was four times the diameter of the rope. A load of 5 percent of rated rope breaking strength was applied to one end and the other fastened to an arm on the shaft of a speed reducer. Nineteen cycles per minute was used and the number of cycles of run determined by appearance of broken rope fibers. First test sample began to show wear at 2,837 cycles. This was established as the number of cycles for future tests on other samples. Two samples of ½-in. sisal were tested using a 2-in. diameter pulley and 100 lb. load.

Two wear tests were made on ½-in. manila rope and both samples failed during test. One made 2,711 cycles; the other 2,351 cycles when strands broke and the test was stopped. A tensile test on another sample from the same coil showed a breaking strength of 2,860 lb. Rated breaking strength of ½-in. manila is 2,650 lb. This rope was received in June, 1941.

Service Test

Table III shows results of tensile tests made on some three- and four-strand sisal and manila rope submitted by the Consumers Power Company's tree trimming department and which had been used by one of its crews. Some samples had been in service twelve weeks and some sixteen weeks. Data on percent decrease in breaking strength is given in the table.

Electrical Test

On electrical test sisal rope was found to compare favorably with manila rope. At 100,000 volts, 60 cycles, no current was passed through the rope during a fifteen-minute test period. These tests were of course with rope in the dry state. On moisture absorption tests, it was found that sisal rope absorbs the same amount of moisture as manila. This information is of interest for rope used in electrical construction.

Table III—Service Tests—All Ropes of Make A

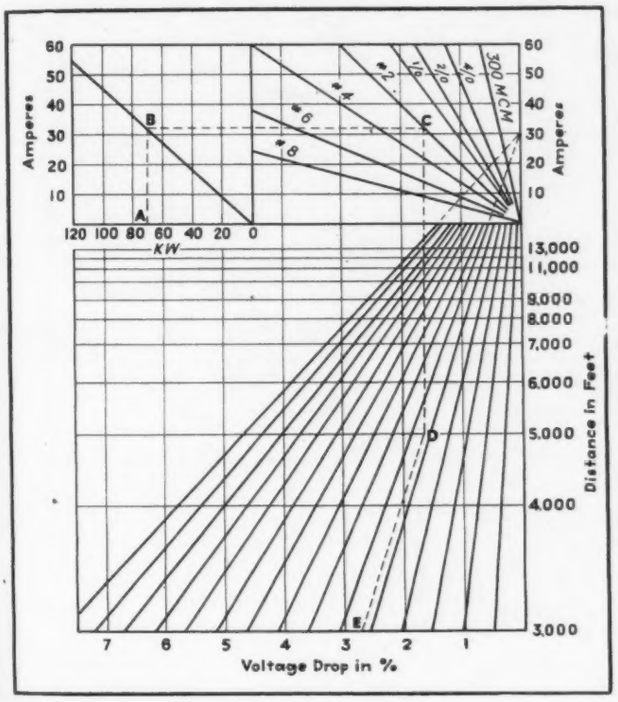
Size	No. Strands	Breaking Strength — Lb. New Rated	New Actual	Used Actual	% Decrease Based on Rated	Based on Actual	Remarks
⅝ sisal...	3	890	....	860	3	....	Pruner rope used two weeks
½ sisal...	4	2,120	....	1,375	35	....	End piece — Tree climbing rope — Used 12 weeks
½ sisal...	4	2,120	....	1,850	13	....	Next to end — Tree climbing rope — Used 12 weeks
½ sisal...	3	2,120	2,545	1,595	25	37	End piece — Tree climbing rope — Used 12 weeks
½ sisal...	3	2,120	2,545	1,750	17	31	Next to end — Tree climbing rope — Used 12 weeks
½ manila.	4	2,650	....	1,330	50	....	End piece — Tree climbing rope — Used 12 weeks
½ manila.	4	2,650	....	1,630	38	....	Next to end — Tree climbing rope — Used 12 weeks
½ sisal...	3	2,120	2,545	1,330	37	48	End piece — Tree climbing rope — Used 16 weeks
½ sisal...	3	2,120	2,545	1,585	25	38	Next to end — Tree climbing rope — Used 16 weeks
½ sisal...	4	2,120	....	1,450	32	....	End piece — Tree climbing rope — Used 16 weeks
½ sisal...	4	2,120	....	1,660	22	....	Next to end — Tree climbing rope — Used 16 weeks

HOW TO DETERMINE PRIMARY DROP COPPER AND ACSR

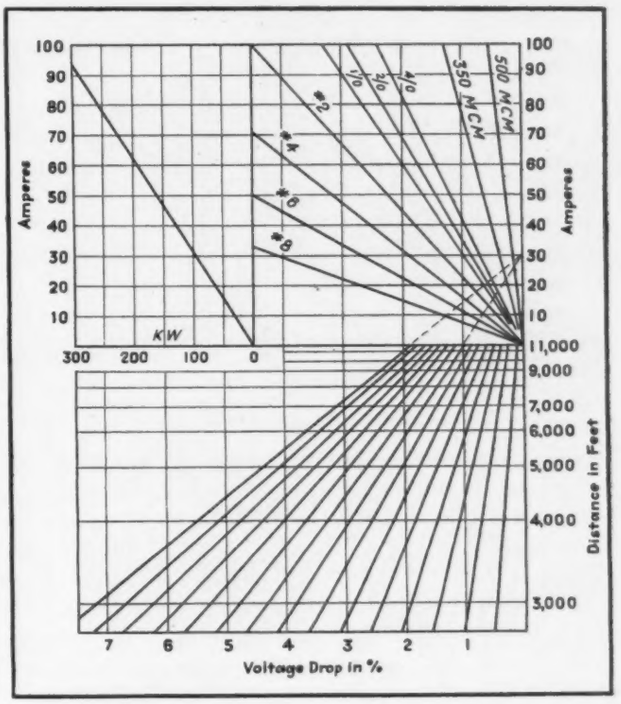
By F. C. RAND, District Manager Gulf Public Service Company, Jacksonville, Texas

Voltage Drop Charts

Assume 24-in. conductor spacing, 95 percent and 80 percent power factor load on single-phase and three-phase circuits, respectively



For 2,300-volt, single-phase circuits



For 2,300-volt, three-phase circuits

INSTRUCTIONS FOR USE OF CHARTS

1. Read the kw. load at (A) on base line of upper left rectangle.
2. Follow vertical line upward to intersection of diagonal line and read amperes at (B).
3. Follow horizontal line to right to intersection of diagonal line for respective wire size, as at (C).
4. Follow vertical line downward to horizontal line denoting respective distance, as at (D).
5. Follow diagonally to base line of chart and read percent voltage drop, as at (E).

If load in amperes instead of kw. is known, then amperes may be read directly in the left margin, and the procedure is similar to the above.

The problem may be reversed, starting with an assumed voltage drop and working back to determine either wire size, maximum load, or distance.

In case the load is greater than the maximum on the base line of the rectangle, then a convenient fraction of the load, such as ½ or ¼, may be substituted, and the resulting voltage drop will be inversely increased, such as doubled or quadrupled, as read on the chart.

In case the distance is less (or greater) than the minimum (or maximum) on the margin of the chart, a multiple (or fraction), such as double or triple (or ½ or ⅓), may be substituted on the chart, in which case the resulting voltage drop will be inversely decreased (or increased), such as ½ or ⅓ (or doubled or tripled), as read on the chart. Note—parenthetical inserts in this paragraph are for distances greater than maximum shown on chart.

The above charts are for copper wire. In case ACSR conductor is desired, approximate results may be obtained by substituting for the copper wire on the chart ACSR conductor two sizes larger; for example, substituting the copper equivalent of No. 4 ACSR, No. 6 copper wire on the chart.

Coordinated Tests, Breaker Maintenance

Programmed coordination of maintenance information about circuit breakers has been used for several years by a Great Lakes utility. Measurement of breaker contact resistance and oil breakdown is correlated with breaker travel analysis (by the Cincinnati G.&E. method) and insulation test (Doble system). Information obtained is entered on a card system, shown, which records for every breaker on the system its rating data, dates of operation, values of short circuits interrupted and cumulative total of arbitrary "units" intended to indicate the relative severity of operating duty to which the breaker has been subjected since last overhaul.

These arbitrary units are the calculated ratio—raised to some power, usually the second—of the short-circuit current interrupted in any instance to the interrupting rating of the breaker—times 100. Each breaker is assigned an average number of normal monthly units which it can be expected to attain in ordinary operation. Departure from this normal duty is cause for investigation.

The cumulative total of such "units" over an operating period is used to guide the scheduling of maintenance and inspection of breakers. On the other hand, the recorded data on oil, contact resistance, travel and insulation provides the basis for comparing condition of breakers "as found" with the condition "as left" at the time of last overhaul.

Method of determining contact resistance used is an adaptation of the Detroit Edison method. Using an automobile battery, voltmeter and ammeter, a current of given value (usually 200 amp.) is passed through the contacts, breaker terminals, lugs, bus joints or whatever and the millivolt drop measured. This value is used in calculating watts loss in the contacts at full load rating of the unit to give a measure of contact deterioration. The loss is then compared with that when equipment was new or when last tested.

The company reports that since instituting this system of record keeping failure of breakers in service has been substantially reduced and the interval between routine maintenance and inspection calls has been increased somewhat.

FORM 126-E-317 ACME 26838-6

STATION	SERIAL	DATE PURCHASED	DATE INSTALLED
	K-6066753		

BUSHING DATA

TYPE	SPEC.	SERIAL
SF, CI, 400A-25 KV	M-1560877G-103	(1) 737445 (3) 737444 (5) 1018623 (2) 737443 (4) 737442 (6) 737527

DATE	OIL	DOBLE	CON. RES.	TRAVEL	REMARKS
6-12-39	Gap 0-K			(F) 0-22, C-35	
6-20-39	.11-.22-.11	3.2-3.2-2.8	(F) 290-310-280 (L) 250-275-250	(L) 0-17, C-30	

STATION	S.C. AMPS.	AT BKR.	AT LINE END	MILES OF LINE	BKR. S. C. RATING	* CUMULATIVE TOTAL OF UNITS
	LINE FAULT	950	420		3300	
	GND. FAULT	990	132	34.9		
	NORMAL UNITS / MO. 3			UNITS = 100 (S.C./RATING)²		

DATE	FAULTS	DUTY	UNITS	*	DATE	FAULTS	DUTY	UNITS	*
	4-G	4-525	10	10					
	1-G	1-300	0.8	10.8					

CKT. NO.	MFG.	TYPE	MECH.	KV.	AMPS.
	G.E.	FKD-136-1026A	MK-4	25	400

CKT. NO.	SERIAL	DATE PURCHASED	DATE INSTALLED

BUSHING DATA

TYPE	SPEC.	SERIAL
		(1) (3) (5) (2) (4) (6)

DATE	OIL	DOBLE	CON. RES.	TRAVEL	REMARKS

FORM 126-E-417 ACME 26839-6

STATION	CKT. NO.	SERIAL NO.

DATE	REPORT
6-12-39	Overhaul - Dressed contacts (were burned) - Tanks cleaned and oil filtered.

BREAKER operating and maintenance records give indication of severity of duty and guide overhaul of breaker operating elements

Old Pendant Units Serve War Effort

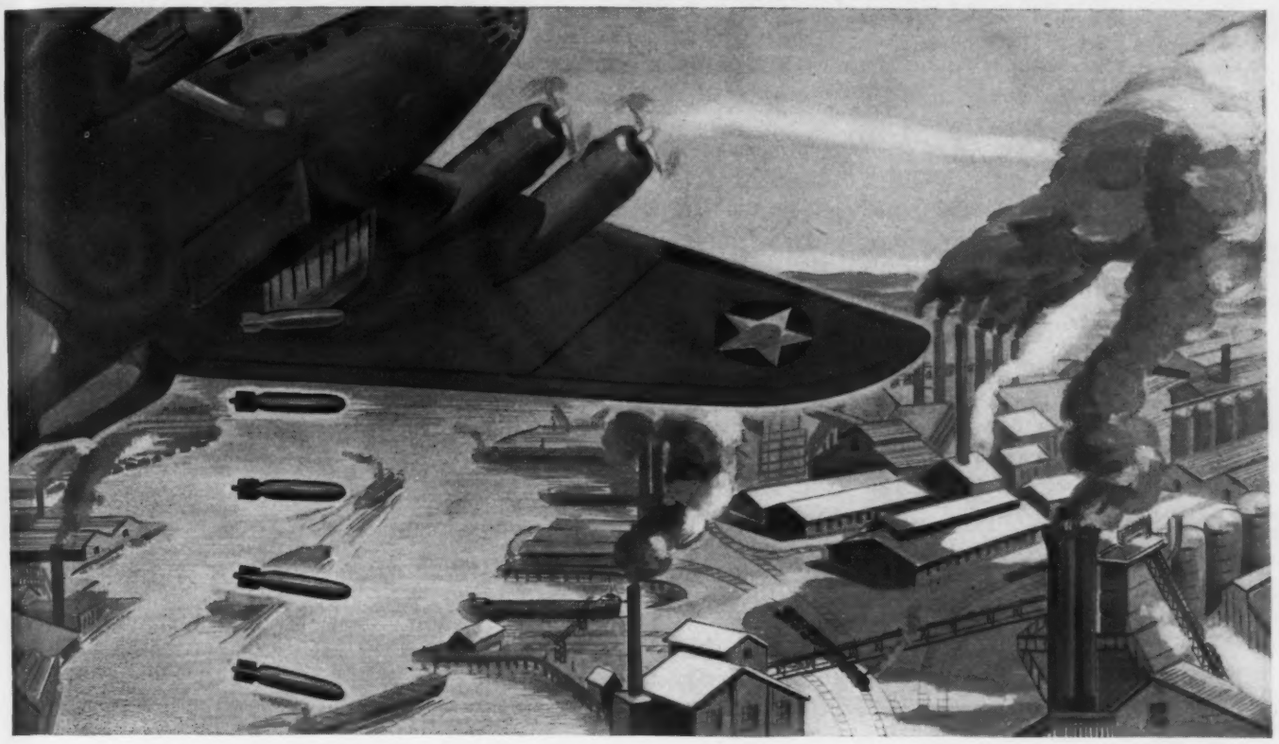
By E. H. RICHTER
Engineer, Municipal Lighting
Detroit Edison Company, Detroit, Mich.

Best argument for critical re-examination of "antiquated" equipment is found in the experience of the Detroit Edison Company with several hundred technically obsolete street-lighting units which it put back to work recently to floodlight plant property. Minor changes in design were made, it is true, but the fact remains that equipment which two years ago was destined to be scrapped is now doing a war job well.

Original luminaires were of the suspended type (shown) used some years ago in suburban Detroit for highway lighting, but since removed when modern equipment was installed or when the greater portion of some 400 miles of highway lighting was discontinued. Self-contained and with an auto-transformer, they operated on a straight 6.6-amp. series circuit with 6,000- or 10,000-lumen lamps. Because they were obsolete there was no apparent use for them and it soon appeared evident that they were destined for junk.

However, with World War II the problem of protective and fence lighting demanded attention. Instead of trying to do the job of fence lighting

AN ELECTRICAL WHOLESALER HELPS SPEED WAR PRODUCTION



WESCO'S help made bombs 68 days earlier

WESCO SPEEDS PRODUCTION

* A Marine air base needed delivery of hundreds of electrical items next morning. Five Wesco Houses pooled stocks and met the deadline.
* Lack of a critical product threatened to tie-up a war chemical plant. The manufacturer promised delivery in 60 days. Wesco delivered in 24 hrs.!

WESCO SERVES BUSINESS

* By warehousing stocks in anticipation of customers' needs.
* By providing engineering service in making up lists of materials and in preparing bids on jobs.
* By buying large quantities at low prices and passing the savings on to small-quantity buyers.

The name that means everything in electricity

Electrical Items Delivered in Two Days— 92 Internal Records Eliminated

In Texas a new plant to make the base of a High Explosive was racing to completion. Its capacity was vitally needed to break the bottle-neck of ammunition shortage. Suddenly, lack of two electrical products pulled the job up short. Inquiries to manufacturers brought the disheartening reply—"Best delivery 8 to 15 weeks." This meant a complete tie-up.

The local Wesco House was called, combed its stocks and delivered the critical products in 2 days; the work went on and the job met the scheduled deadline. As a "dividend" Wesco cut the customer's office routine transactions from 126 down to 34. He was saved the time, work and paper involved in keeping 92 records which would have been required had he dealt with the manufacturers.

Today Wesco's abilities, services and stocks are "all out" to help America win the war. On V-day they will as wholeheartedly respond again to help American business win the peace.

Westinghouse

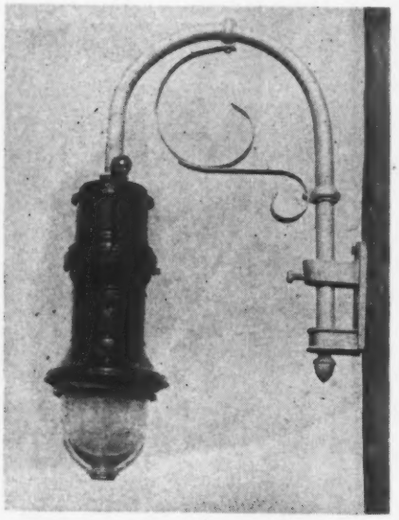
ELECTRIC SUPPLY CO.

150 VARICK STREET · NEW YORK, N. Y.

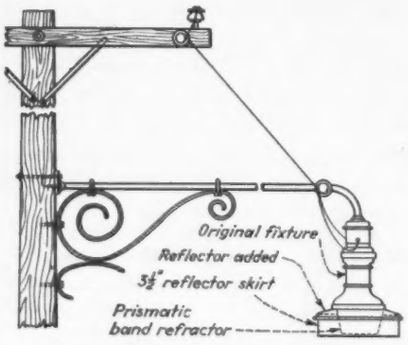
A NATIONAL DISTRIBUTING ORGANIZATION WITH 79 BRANCHES

around its plants and substations with new units, the company resurrected the old street light fixtures and applied them to good advantage.

While some newer types of lighting units did an excellent job of lighting the fence line, they failed to illuminate the area far enough outside and inside the fence. Guards had little opportunity to see men approaching the fence and entering the property.



ORIGINAL FORM of pendant lighting unit adapted to protective lighting service



ADDITION of reflector, reflector skirt and prismatic band refractor convert old highway lighting unit to serviceable protective lighting fixture

With but few changes the old street light units yielded a 360-deg. circular distribution pattern which was desired. The acorn globe was removed and a prismatic band refractor substituted that distributed the light downward and in a circular area, half inside and half outside the fence. To increase the intensity of downward light a reflector (see the accompanying diagram) was added. But with the reflector the light was still too glaring to be viewed with comfort from a watchman's tower. To hide the light source a 3½-in. skirt was next added to the reflector. With this skirt light normally lost above the horizontal is deflected down and adds to the intensity on the ground.

The remodeled units shown are normally spaced 125 to 150 ft. apart and 25 ft. above ground, generally on a level or slightly below the guard tower platforms.

Originally installed on the Detroit Edison property, these obsolete luminaires worked so well that word of their success spread about Detroit and now requests are being received from local war industries for a portion of the remaining stock.

•

F-Lamp Troubles Diagnosed in Field

Satisfactory performance of fluorescent lamps is dependent upon not only the quality of the lamps themselves but also the correct functioning of the auxiliary equipment. The performance of fluorescent lamp ballasts is affected by their temperatures and these are determined to a considerable extent by the ways in which the ballasts are installed in the luminaires. Thus fluorescent lamp performance may be the end result of a chain of causes.

For this reason the correct diagnosis of a case of unsatisfactory fluorescent lamp performance is not usually a simple problem which may be resolved by examination of the lamp alone. It is often necessary to make tests of the auxiliary equipment also to find the seat of the trouble. To remove the ballasts to the laboratory for such tests usually involves the partial or complete dismantling of the luminaire and is therefore impractical. It is desirable to have portable equipment with which the causes of fluorescent lighting troubles may be traced in the field without removing the lamp ballasts.

Such a portable test kit has been designed and constructed by Electrical Testing Laboratories, Inc. It is contained in a carrying case 18x25x6¼ in., the complete kit weighing 45 pounds. The test kit is carried to the scene of the trouble and is connected by means of flexible cords to the lampholders and starter socket of the luminaire after removal of the lamp and starter. The lamp and starter are connected to the kit. With the kit thus connected it is possible to make as many of the following tests as may be necessary to locate the cause of the trouble. It has been found possible to perform all the tests in this list in eight to ten minutes:

Tests of lamps (4 to 100-watt sizes inclusive):
- Test for air in lamp.
- Test for continuity of cathodes and lead-in wires.
- Visual observation of cathodes and anodes.

PORTABLE kit for field tests of fluorescent tubes, starters and ballasts

- Measurement of lamp volts, amperes and watts when operated at rated line volts with reference to ballast in kit.

Tests of starters (glow and thermal types):
- Test for open heater of thermal starter.
- Test for open contacts of thermal starter.
- Test for short-circuited starter of glow type.
- Measurement of total cathode preheat time.
- Test of ability of starter to light lamp on leading or lagging circuit over a range of supply voltages.
- Measurement of minimum switch operating voltage of glow starter.

Tests of ballast while installed in luminaire (4 to 100-watt sizes inclusive):
- Measurement of voltage supplied to ballast.
- Measurement of open circuit volts delivered by ballast.
- Measurement of preheat current delivered by ballast.
- Measurement of lamp volts, amperes and watts when operated with ballast in luminaire at existing supply voltage.
- Test for short-circuited series capacitor in two-lamp ballast in luminaire.

Fighting words—these

"Munitions of War" covers the widest range of materials and supplies—and who's to say that the Yank's fighting togs aren't just as important as his fighting tools.

The important consideration in ALL requisitioned articles for this conflict is that each in its own way be *Satisfactory, Convenient, Durable, Efficient.*

Testing and Research Services at E.T.L. are used by suppliers to government for presentation of FACTS as assurance to the authorities, as reassurances to themselves, on such divergent equipment as—

Acoustic Materials	Flooring Materials
Airplane Accessories	Insulating Materials
Buttons etc. for Uniforms	Lighting Equipment
Explosion-Proof Fixtures	Mirrors, Paints, Plastics

—and many other Munitions of War—all measurable by the test equipment and experienced staff at E.T.L.

Electrical Testing Laboratories, Inc.

HEADQUARTERS AND LABORATORIES
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BUTTERFIELD 8-2600

PMENT: More than three ed pieces of testing appa- ratus on inventory.

STAFF: More than 150, experienced in test procedure.

ELECTRICAL AND GENERAL TESTING · INSPECTIONS · RESEARCH CERTIFICATION

HOW* TO HANDLE LINE AND EQUIPMENT CLEARANCES—II

ON POTENTIAL TRANSFORMERS

When issuing clearances on potential transformers, the low-tension as well as the high-tension switches must be opened and tagged. If fuses are provided the fuses must be removed when clearances are issued. At some stations knife switches are provided in the secondary circuits of the potential transformers. These knife switches are designated by the number of the high side switch plus the letter "P." Where secondary potential knife switches are provided the dispatcher will order the high side and the "P" knife switch opened in order to effect clearance.

On phase-to-phase potential transformers which are provided with single-blade disconnects a high resonant voltage is sometimes built up when one blade is opened with a switch stick. All such potential transformers should be de-energized or energized with an oil circuit breaker whenever possible.

ON APPARATUS AT SEMI-AUTOMATIC OR AUTOMATIC STATIONS

Certain non-attendant stations are equipped with synchronism check relay schemes, reclosing devices, timing trip devices, synchronizing relays and other forms of automatic equipment which render the station either partially or fully automatic in operation. These stations depend largely on potential transformers for proper sequence of operation. *No potential transformer circuits should be broken, and no clearance issued on any automatic apparatus without first consulting the office of the operating engineer.* In the event a representative of the operating department cannot be located, the load dispatcher will be responsible for the proper operation of knife switches and other switching necessary to safely take the automatic equipment out of service.

ON TIE LINES WITH OTHER COMPANIES

Clearances on tie lines with other companies shall be handled by the Alabama Power Company load dispatchers in cooperation with the load dispatchers of the other companies. For specific instructions in regard to these tie lines see procedures for the stations where these tie lines terminate.

ON GENERATORS

Before issuing clearance on any generator, the dispatcher or operator responsible for such clearance will, in addition to clearing the generator electrically, also have the steam turbine or water wheel operator place a hold tag on the mechanical governor of the prime mover. The actual order for the placing and removal of the prime mover hold tag will be transmitted by the switchboard operator to the turbine operator. The standard red hold tag will be supplied the turbine operator for this purpose.

ON LINES CONNECTED TO CUSTOMERS GENERATING EQUIPMENT

System operating experience with customers' generating equipment has shown that customers may possibly put such equipment in operation without the knowledge of the dispatcher or operator directly concerned. Since such generating equipment presents a very serious hazard to men working under clearances, it is absolutely necessary that *all* switches controlling possible sources of potential from customers' generating equipment be opened and tagged each time clearances are issued. *Switches must be opened and tagged regardless of whether or not the customers' equipment is in operation at the time clearances are issued.*

Division superintendents will be responsible for keeping the office of the operating engineer informed as to the status of customers' generating equipment and as to all interconnections with railway signal circuits in his division. Where necessary the operating engineering department will issue joint customers' operating procedures.

Customers' generating equipment is shown schematically on the division single-line switching diagrams as issued by the office of the operating engineer.

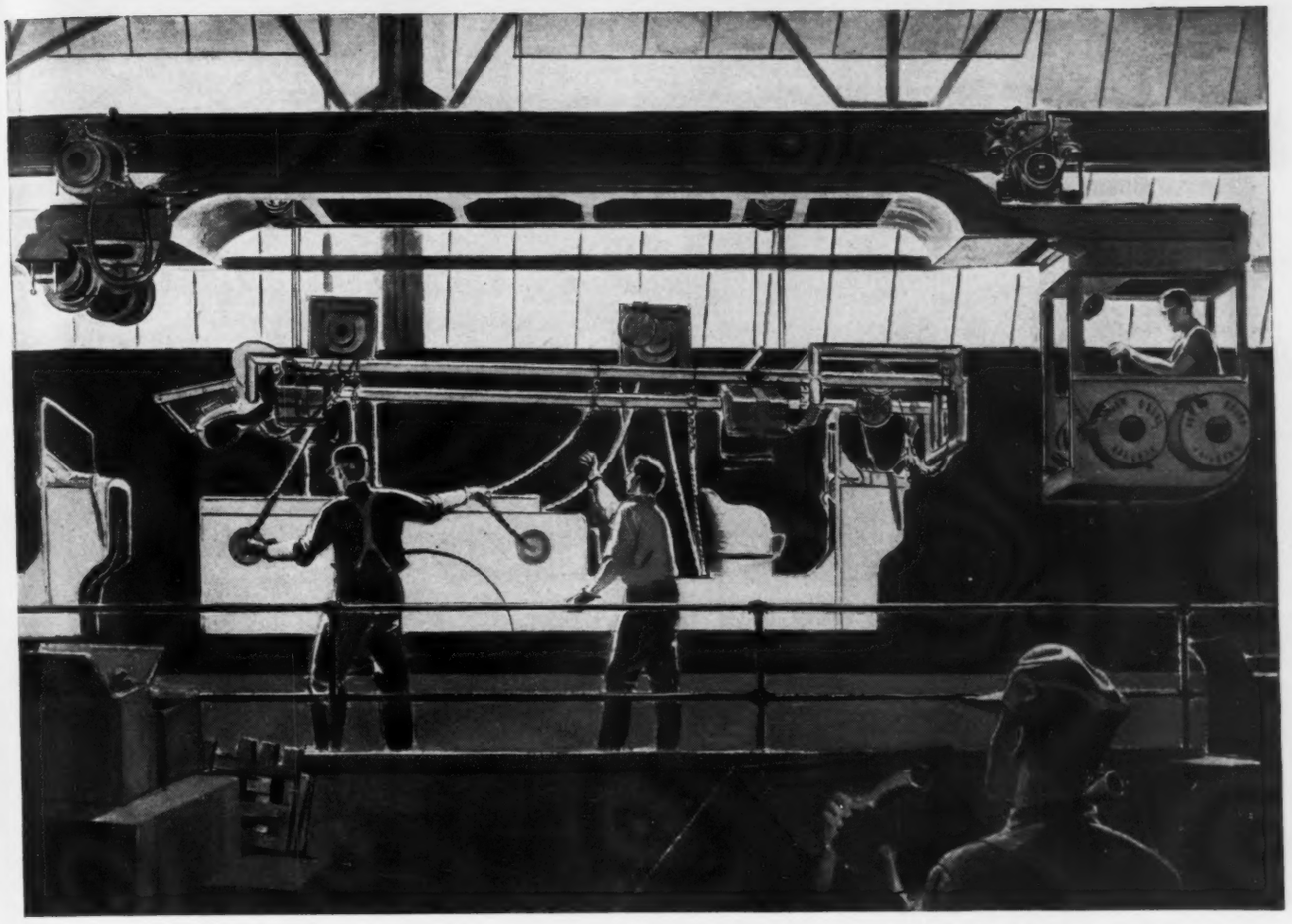
ON MACHINES WITH CARBON DIOXIDE FIRE PROTECTION

Certain rotating machines on the system are provided with carbon dioxide gas fire-extinguishing equipment for fire protection in case of failure within the machine. This gas is liberated by the action of the machine differential relays, and once released the gas continues to flow until the total charge has been released. When the gas is liberated the intake air doors of the machine are released and close by gravity or spring action.

Before issuing clearances on machines which are equipped with carbon dioxide fire-extinguishing equipment the operator who issued the clearance *must make sure that the gas release mechanism is mechanically blocked open* and the machine air intake doors are either tied open or mechanically blocked open. The gas release mechanism must be blocked by the clamp which is provided on each gas release relay. Before placing the machine back in service the operator who issued the clearance must make sure that the gas release mechanism is free to operate and that all blocking is removed from air intake doors.

At each installation an emergency hand release is provided which is inclosed in a glass front case. In the event fire is discovered in the machine and the differential relays have failed to release the carbon dioxide gas, it will be the duty of the operator to break the glass and release the gas by hand.

*According to operating procedures of the Alabama Power Company.



Converting to War Production—

Detroit Engineer Eliminates Frequent Insulation Failures

Hoist motors used to be rewound every 3 months because of overloads. Then engineers tried Fiberglas* with these results:

★ ★ ★

One a minute—night and day—truck bodies for the U.S. Army roll off the line of a Detroit plant. During manufacture, the bodies are shifted by electrically powered hoists. Under pre-war, 8-hour-a-day operation, overloads caused insulation failure in the 5 H.P. motors of the hoists about once every 3 months. Over a year ago, Fiberglas was adapted to the rewinds. Although the motors are now working 24 hours a day—7 days a week—overloads have not caused a single insulation failure.

★ ★ ★

PUTTING EXTRA MONTHS of service into motors and getting *more* than rated capacity from them is one of the most effective methods at our disposal for getting increased war production. In many cases resourceful engineers have secured results comparable to that of new equipment which wasn't quickly available.

And one method which they are skillfully utilizing to get these results is the application of Fiberglas electrical insulation—*in ever-increasing volume.*

In plane factories—munition plants—steel mills, for example, conditions of high operating temperature and overloading are more prevalent than ever before. These conditions frequently cause insulation failure in electrical equipment. Curtailed production results at a time when production is most needed.

Alert electrical men have repeatedly solved these problems by using Fiberglas as a component of the electrical insulation in motors, generators, and transformers of many varied types.

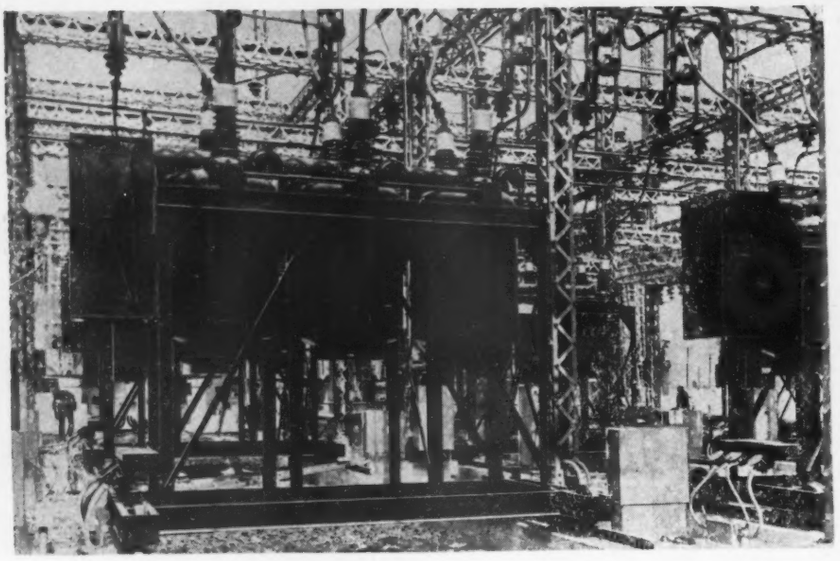
There is a Fiberglas product for every electrical-insulation need . . . tapes, sleevings, tying cords, cloths, Fiberglas-backed mica combinations, and varnished cloths, Fiberglas-base laminated materials, saturated and varnished tubing, and Fiberglas-insulated magnet wire.

Consult your electrical manufacturer or service repair shop about Fiberglas electrical insulation. And if you are confronted with overload problems, remember how other engineers are solving these problems by gaining extra power with the help of Fiberglas. *Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

OWENS-CORNING

FIBERGLAS

*T. M. Reg. U. S. Pat. Off.



ASSEMBLED oil circuit breaker tanks utilize welded steel

Welded O.C.B. Tanks Reveal Advantages

Automatic and hand welding of twelve tanks for 34.5-kv., 1,200-amp., 1,500,000-kva. outdoor oil circuit breakers belonging to the Los Angeles Bureau of Power and Light was successfully handled recently by a carefully organized technique. The specifications required that the plates used in the tanks should be of steel, meeting A.S.T.M.A-7-39 demands, viz., tensile strength 60,000 to 72,000 psi, with a yield point of 0.5 of the tensile strength and in no case below 33,000 psi. After these tests, the plates were cut and beveled by acetylene torch and shaped for the tank shell. The longitudinal seam was automatically welded on the outside with a one-pass weld. The inside of the seam was then chipped to clean the base of the weld for inspection. Finally, the seam was closed with manual arc welding with $\frac{5}{16}$-in. mild steel rod.

The bottom was shaped with the gas torch and tacked upon the shell. If the fit passed inspection, the bottom was automatically welded upon the outside of the girth seam. The seam was chipped to clean metal on the inside, and after visual inspection, manual welding followed. All manual welds were multiple pass.

Welding was closely checked by test bars, radiographs and visual examination. Test bars on the longitudinal seams were continuations of the regular welds, while those of the girth welds were made separately. The tensile and free bend tests were all satisfactory.

Radiographs were made on selected sample tanks. If the weld showed faults, it was chipped out, rewelded and again radiographed. Then the tank was thoroughly stress relieved by being kept at 1,200 deg. F. for one hour per inch thickness of plate, followed by gradual cooling for 6.5 hours. All tanks were hydrostatically tested at 150 psi. for five minutes, with hand hammer blows to check conditions, and finally, each tank was sand-blasted and painted.

W. A. Shelton, mechanical engineer at the Los Angeles installation, stated that welded fabrication of these tanks was quicker, more economical and lighter in weight than when using cast-iron tanks. The welding was done by the Southwest Welding Company, Alhambra, Cal., and this application was a prize- winning entry in Hobart's Arc Welding News Contest (Troy, Ohio).

Tensile and Free Bend Tests of Welded Bars

Tank	Seam	Tensile Section	Yield Point Psi.	Ultimate Psi.	% Elongation	Free Bend Fracture	Free Bend Hand	Free Bend Automatic	Nick Bend
4	Girth	Reduced	53,340	69,370	24.5 (2 in.)	Weld	33	33	OK
6	Longit.	Full	39,030	61,850	19.4 (8 in.)	Plate	50	39	OK
18	Longit.	Full	40,730	64,220	18.1 (8 in.)	Plate	67	39	OK
25	Longit.	Reduced	52,870	69,230	24.5 (2 in.)	Weld	44	24	OK
36	Longit.	Full	38,620	62,700	16.9 (8 in.)	Plate	59	36	OK

More Steam—How?

11. Removal of Fuel-Oil Slag*

By ALFRED IDDLES
Application Engineer Babcock & Wilcox Co.

We were all taught to believe that if we could only have oil for fuel we would have no more troubles. Some of our worst slag problems today result from fuel oil. Quite likely we in the East may not be worrying much about this in the next few months, but I do want to emphasize the fact, for those who may be still using oil or those who may do so after the war, that a new and troublesome feature has developed recently. The condition was observed several years ago, but did not become prevalent until about two years ago, when certain fuel oil began to produce a very hard slag on boiler and superheater tubes. Apparently this fuel oil is contaminated either at the source of the crude or more likely at the refineries where certain chemicals have been added in the refinery processes.

This material analyzes largely sodium sulphate with some proportions of vanadium and nickel commonly reported in the sulphate form. This scale is so hard that in some cases it cannot be blown off. It is like concrete to chip off after the unit is down. Usually it is best removed by softening with a fine mist of water or the equivalent in low-pressure steam applied periodically. This water will soak into the slag and soften it so that it can be removed by bars or scrapers. Under some circumstances extremely forceful steam jets will keep the material from collecting. This is particularly true apparently in the zone of 1,600 to 1,800 deg. temperature. It collects on the low-temperature end of superheaters and on economizers.

Wherever a choice is available, investigation should be made before long-term contracts are entered into and such troublesome fuel eliminated. Where this choice is impossible, then the steam unit design should be

*This series began in the May 16, 1942, issue of "Electrical World," adapted from author's talk "What the Operator Wants to Know" to Steam Power Division, A.S.M.E., Metropolitan Section, March 25, 1942.

viewed from the standpoint of experience with coal slag and provision made in tube spacing, velocity of gases and other arrangements so that a minimum of damage will result.

A summary of this subject of slag indicates to me the following conclusions:

1. Users of fuel oil should be on the watch for troublesome slag.
2. No slag plugging of convection surface need be encountered except with loads or types of fuel not contemplated in the design.
3. Mechanical blowers adapted to the character of the slag or ash are now available in a much more useful form than was true three years ago.

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Guides Thermocouples Into Occupied Ducts

By ANDREW BODICKY
Cable Engineer Union Electric Company of Missouri, St. Louis

With war loads on cable systems increasing by leaps and bounds the field measurement of cable operating temperatures in occupied ducts is becoming a frequent necessity. Accurate measurement of cable temperature requires that thermocouples be placed on the cable sheath within the duct at one or more locations along the run being investigated.

Difficulties have been encountered in pushing thermocouple wires into ducts for any considerable distance because the lath or push rod used had a tendency to buckle or wedge in the

DEVICE prevents wedging in guiding the thermocouple wires into occupied cable ducts

crescent-shaped space between the cable and duct. It sometimes broke off, leaving a section of lath and the thermocouple lodged in the duct.

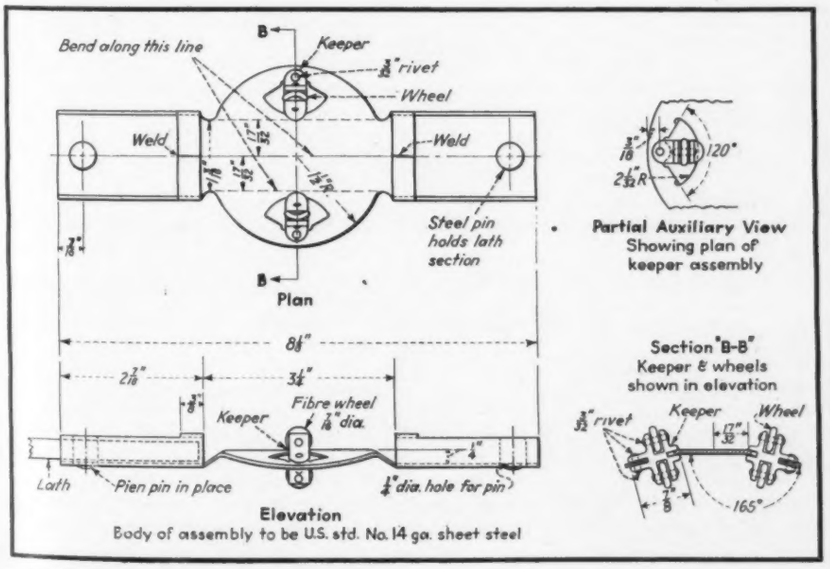
To meet the situation an ingenious guide, shown, has been developed by Union Electric Company of Missouri, St. Louis, to keep lath sections from wedging during the pushing operation. With it, thermocouples have been pushed up to 250 ft. into occupied ducts without difficulty.

The guide, shown in the accompanying drawing and picture, is made of No. 14 gage sheet steel. It consists of a central disk 3 in. in diameter bent along two lines parallel with an offset $\frac{1}{32}$ in. from each side of the center line of the device to form two dihedral angles of 165 deg. Bent in this manner, the disk conforms roughly to the curve of a $3\frac{1}{4}$-in. diameter power cable. In each of the segments formed by bending the disk, a fan-shaped opening of 120 deg. is cut to accommodate a keeper with two $\frac{7}{16}$-in. diameter fibre wheels that protrude above and below the disk surface. The keeper and wheel assembly is pivoted at the outer edge of the disk and is free to swing within the fan-shaped opening. Facilities are provided at opposite sides of the disk to fasten lengths of lath to the guide.

With the guide attached to the leading end of lath or push rods and between alternate 8-10-ft. sections it prevents troublesome wedging. As the end or section of lath tends to work into the space between the cable and duct, wheels on one of the keepers come to bear on duct and on the cable sheath. Movement of the keeper cants the wheels to bring the guide again to the top of the crescent-shaped void between cable and duct.

This device has been in use for several months on the St. Louis system and has successfully overcome previous difficulties in getting thermocouples into occupied ducts.

It may be possible with this device to install an additional wire or cable in an occupied duct without necessitating removal of original cable.



DESIGN details of thermocouple guide

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Wringer Removes Cleaning Oil

Sometimes repair of a damaged transformer requires that the iron core be taken down and rebuilt. For a core to be restacked without having a lot of iron left over it is necessary that each single lamination be clean and dry when it is laid in place. Usual procedure is to wash off the insulating oil on the surfaces of the laminations in a bath of mineral spirits which lies between kerosene and gasoline and is better for this use than either, having better cleaning value than the one and being less dangerous to use than the other.

But having had the transformer oil washed off it, the lamination is now wet with mineral spirits, which also can cause difficulty in the restacking operation. And, too, it is rather wasteful of cleaning fluid to let it be carried off on the article cleaned. Why not put it through the wringer? This is exactly what is done in the transformer repair shop of the Georgia Power Company. The wringer is one on a used washing machine, thus equipped with motor and drive, ready to go without any reconstruction or adaptation at all. Of course, the cleaning oil is rather hard on the rubber wringer rolls and it is necessary to sand them down to smooth surface occasionally.

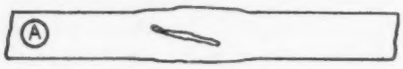
HOW TO REPAIR AND SPLICE

RUBBER-JACKETED CABLES

Instructions issued by Simplex Wire & Cable Co., Cambridge, Mass., with relation to "Tirex" cables, but applicable to rubber-jacketed cables in general and, in large measure, to buried cables.

SINGLE-CONDUCTOR CABLE—INSTRUCTIONS

REPAIRING



(A) Bruised cable

(B) Damaged insulation removed

(C) Insulation scarfed or penciled

(D) Thickness of splicing tape

1. For repairing or splicing—length of scarf to be four to five times rubber thickness.

2. Clean and coat scarf and cable for 2 in. beyond scarf with cement.

3. Allow cement to become "tacky."

4. When repairing—Apply splicing tapes between scarf to same thicknesses as original insulation and jacket.

4a. When splicing—Apply splicing tapes between scarfs until thickness over conductor splice is equal to that of the original insulation and jacket.

5. If repair or splice is unvulcanized apply friction tape over-all one-half lap to 2 in. beyond ends of repair or splice and apply a waterproof paint.

Note—A sharp knife slightly moistened will facilitate making the scarf.

SPLICING

(E) Cables to be spliced

(F) Conductors spliced

(G) Insulation scarfed or penciled

(H) Splicing tape applied

THREE-CONDUCTOR CABLE—INSTRUCTIONS

1. Open cable and remove damaged insulation. Splice conductors as in conductor A where necessary. If cables are shielded type slit shield and tie back out of the way for further use. Spliced conductors should be staggered as shown.

Ground conductors should be spliced if necessary and covered with friction tape.

2. Scarf insulation as shown in illustration I.

Length of scarf to be four or five times thickness of insulation.

Clean and apply coating of rubber cement over scarf and for 1 in. along conductor insulation.

Allow cement to become "tacky."

3. Apply tape between scarfs.

For repaired conductors, make diameter over repair equal to that over the original insulation.

For spliced conductors, make thickness of rubber over splice equal to that of the original insulation.

Apply one layer of friction tape one-half lap. If cable is shielded type replace conductor shields.

4. Pull conductors together—lay in jute fillers in interstices and apply one layer of friction tape. Replace shield if present.

5. Scarf Jackets—length of scarf to be four to five times thickness of jackets.

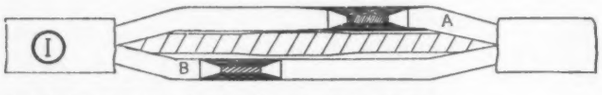
Clean and apply coating of rubber cement over scarfs and 2 in. along cable.

Allow cement to become "tacky."

Apply tape between scarfs until thicknesses equal that of the original jackets. Refer to illustration J.

If repair or splice is unvulcanized apply one layer of friction tape (one-half lap) over all and paint with a waterproof paint.

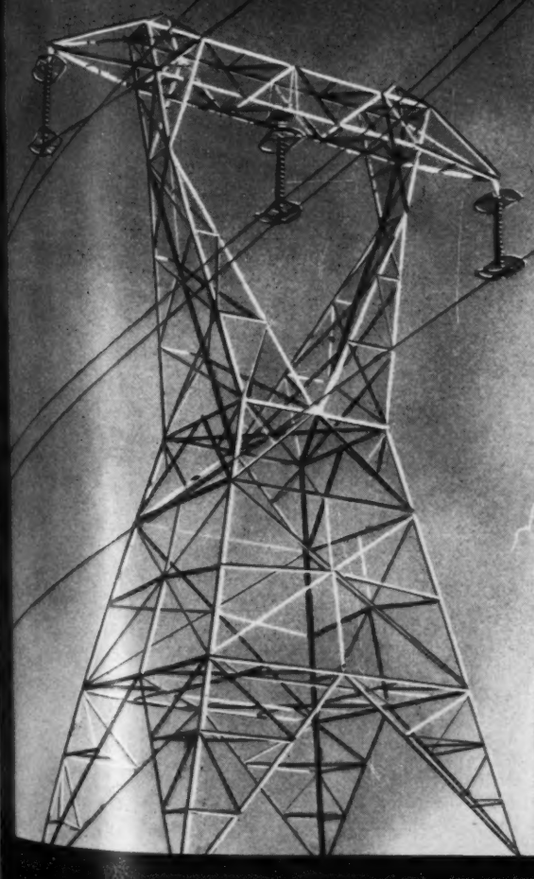
Note—A sharp knife slightly moistened will facilitate making the scarf.



(I) Individual conductors A and B insulated

(J) Splicing tape applied to equal thickness of original jacket

"Fair-Weather" Power Highways Won't Do



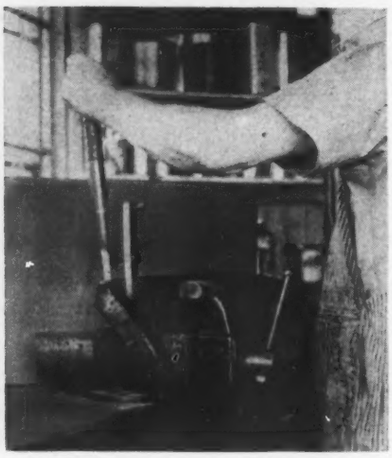
When power fails, production grinds to a stop. Important in the dependable delivery of power are the transmission towers that support the power lines. Not surprising, therefore, that operating engineers everywhere turn to Blaw-Knox transmission towers. Engineered into them is the satisfying certainty that they will not only make a good appearance during fair weather, but that they will withstand the stresses of storm, flood and frost. Because they are correctly designed, fabricated and galvanized, their maintenance cost is extremely low. A discussion is invited with regard to any power transmission problem.

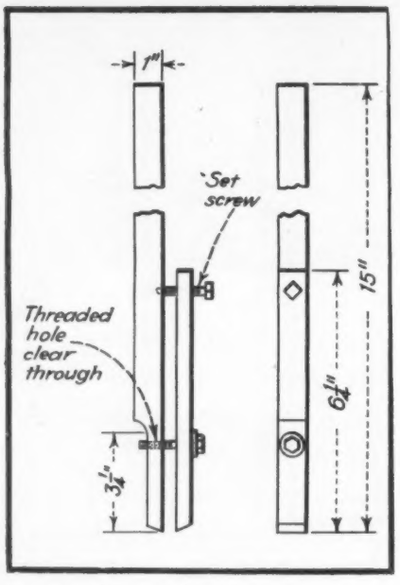
BLAW-KNOX TRANSMISSION TOWERS

AW-KNOX DIVISION OF BLAW-KNOX COMPANY 2013 FARMERS BANK BUILDING, PITTSBURGH, PA.
NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM

"Twister" Protects Repaired Rotor Coils

New, green coils go into the slots of a rotor readily without danger of breaking the insulation inside the coil. But old coils, on repair jobs, are dry and hard all the way through. Such an old coil must go into the slot perfectly true, without rough handling lest a breakdown of the insulation at some point inside cause a short between conductors.





BAR WRENCH twists coil without damaging insulation

Often it is necessary to give a twist to one side of a coil to make it fall into place. To do this with an ordinary tool, a monkey wrench for instance, may damage the outer as well as the inner insulation, since if there is any play in the tool the bearing may not be the same on all parts of the faces. It may bear only on the top edge and on the lower opposite edge of the coil when pressure is applied. A tool of considerable precision is really required for this work, such as the one here shown, designed and made by the shop department of the Portland General Electric Company, Portland, Ore.

It is 15 in. long. The main member, of steel rod 1 in. in diameter, is flattened at one end to form one jaw. To this the movable jaw is attached by means of a bolt through and through, with set screw at the upper end bearing in a recess in the handle, as shown.

The jaws are fully adjustable and a powerful grip is secured evenly distributed over the surface of the coil. When steady pressure is applied to the handle it will exert torsional stress in the coil without injuring inside or outside insulation.

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Operating Tricks With Boring Machines

A number of "niceties" in the operation of boring machines were the product of rather unique conference of boring machine operators recently held in Clintonville, Wis., by the Four Wheel Drive Auto Company. Purpose of the conference was to assist officers of the Bomb Disposal School in collecting fine points in the operation of boring machines to impart to neophyte army boring machine operators. A call sent out to leading power and telephone companies in Wisconsin for their best boring machine operators brought men with five to fifteen years experience from such organizations as Wisconsin-Michigan Power Company, Wisconsin Power & Light, Wisconsin Bell Telephone Company and others.

A summary of the operating suggestions and techniques brought out during the conference follow:

Rocks—When a boring machine strikes a rock an experienced operator can generally tell by "feel" if it can be removed. If it can, use a smaller diameter auger to get around the edge of the rock. A 20- or 24-in. auger seems ideal for this purpose. Rotate the auger blade and at the same time tilt the auger shaft so that the hole is bored beside the rock, then ease the auger shaft back toward the center of the original hole and "come up" at the rock from below, hitting it a sharp blow with the top of the auger.

Practiced operators can place the stones on top of the auger so that when the auger is spun the stone will be thrown into the open 6 or 7 ft. in any direction desired. To do this locate the stone on the auger about 90 deg. from the direction where it is to be tossed. A quick spin of the auger will start the stone in the right direction, and then if the auger shaft is lowered and quickly raised the side of the auger will catch the stone and toss it from the hole.

Soil Tricks—Each soil has different boring characteristics. Clay is the easiest to drill and requires no special skill. In sand and gravel it is best to bring the auger speed to 135 r.p.m., take a quick fast bite, about half a turn, with a lot of feed and bring the load to the surface. Spinning the auger more than one-half turn in sand and gravel is a waste of time. With certain powdery soils a little water in the hole helps the digging as it keeps the soil on the auger blades. Soil a little wet makes for quicker digging. In muck avoid getting too large a load on the auger. Suction will prevent raising the load. The gate on an auger that prevents soil from returning down the spiral is frequently not necessary in cold weather and causes trouble. It freezes shut and won't allow soil to come up the spiral of the auger.

Obstacles—Try to develop a feel for the capacity of the machine and a sensitiveness on the controls. It helps detect variation in material being bored. A skilled operator can feel a water pipe when he strikes it. It has a certain give that is not common with rocks. Tile sewer and cast-iron water pipe are more difficult. If their presence is known operators can tell when they strike tile because the smooth surface deflects the blade differently than a rock.

Boring of Trenches—In making trench with a boring machine, the auger shaft should be slanted about 45 deg., depending on soil type. By drilling on an angle and making consecutive holes overlap, spill from the hole being dug will fall back into the hole as the bottom is reached, otherwise a partition has to be left between holes to be removed by hand. Where soil will not fall back into the hole and it is necessary to leave

Improved Transformers

ELECTRICAL DESIGN

MECHANICAL FEATURES

PLANT CAPACITY

MANUFACTURING FACILITIES

AMER TRAN

AmerTran power transformers available for all requirements in sizes to 10,000 KVA, 132 KV.

AmerTran distribution transformers of either oil- or noninflammable-liquid-immersed type available in sizes to 500 KVA, 72 KV.

AmerTran air-cooled transformers for either indoor or outdoor service are available for all industrial requirements—sizes to 150 KVA.

You who are engaged in War work and are fortunate in obtaining AmerTran transformers — you know that some important improvements have been made to these products which have so long proved dependable for all manner of installations by electric utilities and industrial plants. You know that they are new in electrical design—new in many mechanical features. The service these new AmerTran products are performing for war-time industry will never be forgotten—and will give them even greater acceptance in peace time. AmerTran products are engineered and manufactured to meet the specific requirements of their users. Our 41 years of experience—and service to the electrical industry—is standing us in good stead —today. We look forward to resuming all of our former commercial relationships—in peace-time.

AMERICAN TRANSFORMER COMPANY, 178 Emmet St., Newark, N. J.

Manufactured Since 1901 at Newark, N. J.

AmerTran transformers are manufactured to meet your exact electrical and mechanical requirements.

AMERTRAN

*P.M. is for *Preventive Maintenance*, a term which aptly covers the periodic use of "MEGGER" Testers for checking the condition of insulation in generators, wiring, motors and other electrical equipment. Incipient insulation troubles are thereby detected and isolated . . . and corrective measures can be taken *before* major failures occur. As a consequence, damage or destruction of valuable equipment is prevented and priceless production time is saved. Preventive Maintenance is obviously more practical than permitting insulation to break down—and then hold a Post Mortem to determine the cause.

If you are already familiar with the "MEGGER" Testers and what they do, you most likely have one in your plant. Plan to use it systematically. It is your ounce of prevention against costly electrical breakdowns.

Do you have our Pocket Manual of "MEGGER" Practice? If not, write for a free copy of Manual No. 1420-W.

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a partition, drill about three holes at an angle, then back the truck up, lower the auger to the bottom of the hole and drive slowly forward. The auger will break down the partition. The telephone company reported that it dug 600 ft. of 4-ft. trench in eight hours with a 24-in. auger and it was not necessary to break down the walls between each hole. It was claimed by some that a boring machine can dig a trench just as fast as a ⅜-yd. shovel, although the hole will not be as smooth on the sides. A good boring machine operator can dig more trench than a good shovel operator and will encounter no more difficulty in stony soil than a shovel operator, it was stated.

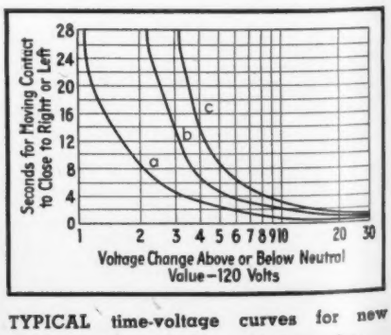
Boring bar can often be used to shove the truck ahead in a bad spot by forcing the auger into the ground at an angle.

•

Voltage-Regulating Inverse Time Relay

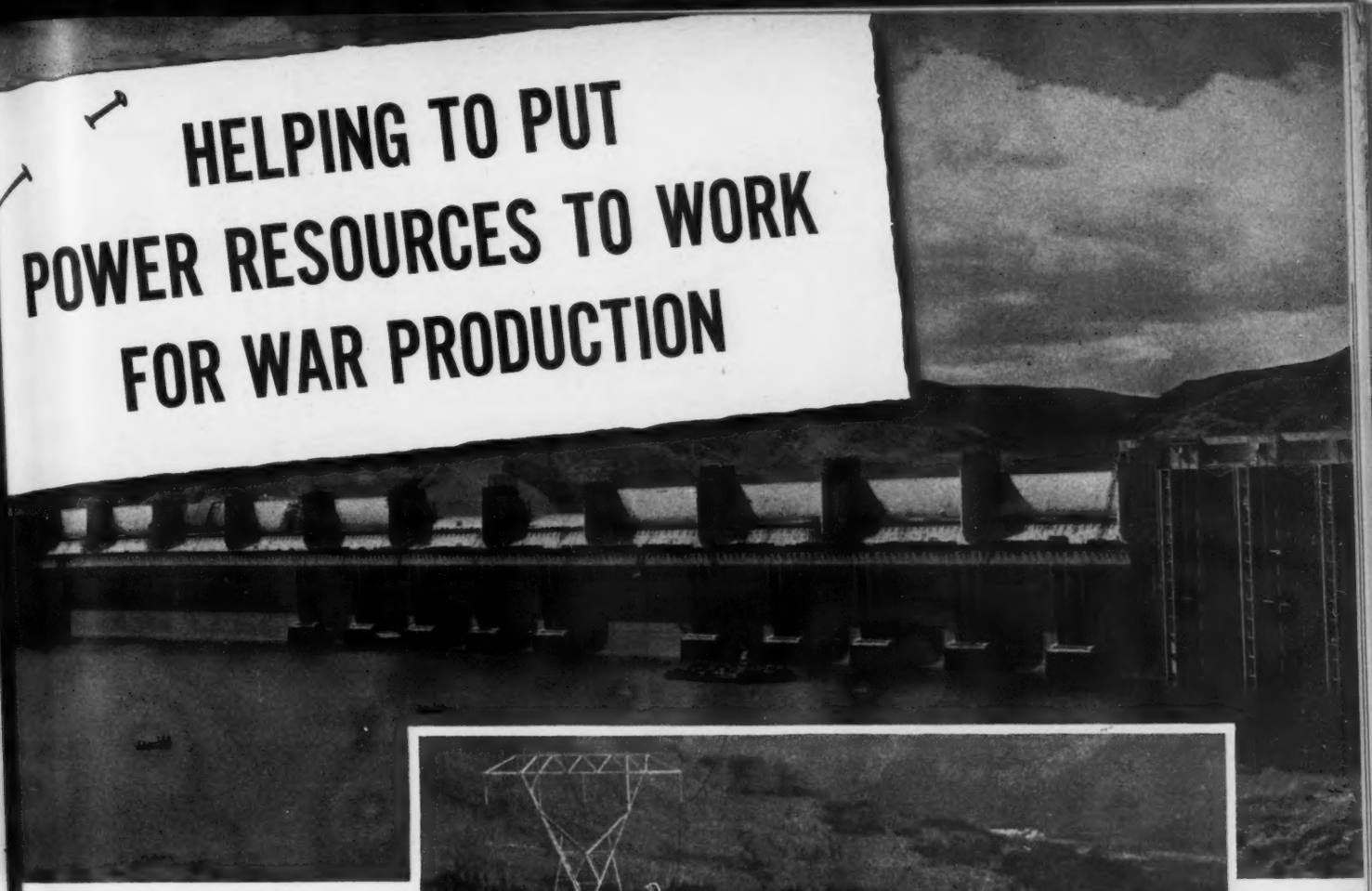
By H. J. CARLIN
Westinghouse Electric & Manufacturing Company, Newark, N. J.

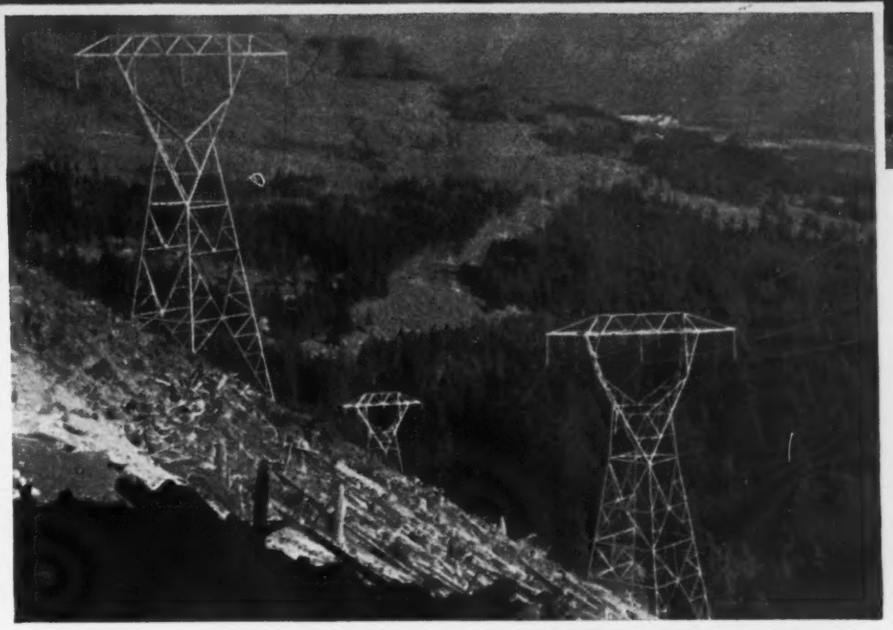
A new voltage-regulating relay with inverse time characteristic and self-contained line-drop compensator has been developed for use with step-voltage regulators. In appearance and operation this new relay is a far cry from the contact-making voltmeters used up to now. It is small and compact in size, has no compounding coils or magnets and operates on the induction-disk principle. This gives the device an inverse time characteristic so that the greater the voltage change on the line the faster is the relay response. Thus, the feeder voltage regulator controlled by the relay



TYPICAL time-voltage curves for new Westinghouse voltage regulating relay
Right-hand contacts set (a) 121, (b) 122 and (c) 123 volts; left-hand contacts set (a) 119, (b) 118, (c) 117 volts.

HELPING TO PUT POWER RESOURCES TO WORK FOR WAR PRODUCTION





AMERICA is fortunate to have entered this war with so many key power projects complete or near-complete. Throughout the nation, as gigantic new war plants have sprung from open fields, production has been sparked into swift activity by a ready source of electrical energy. Whatever the source of power—whether steam or hydraulic—the important thing is it's *ready* to help industry equip and maintain a victorious fighting force.

Fabricated steel structures built by American Bridge are helping to put power resources to work for war production.

Hundreds of steel gates of all types —tainter, rolling, lift and swing—are impounding the waters of many rivers. They harness the flow to control floods, extend navigation to upper reaches, and generate electrical energy.

Thousands of steel towers dot the continent, carrying power lines that radiate from sources of energy to industrial communities and to essential war industries that have mushroomed throughout all sections of the nation. These transmission towers were designed to carry heavy-duty power lines under extreme climatic conditions and to traverse every imaginable type of terrain — deserts, valleys, plains and mountains. Their efficiency has been tested by subjecting full-size "pilot" towers to duplicated field loading conditions in our Test Frame, the largest in the country.

Just as many of the projects we have completed in recent years are serving the war effort in various ways, now all of our resources of equipment, engineering talent, and specialized "know how" are active in projects directly essential to war.

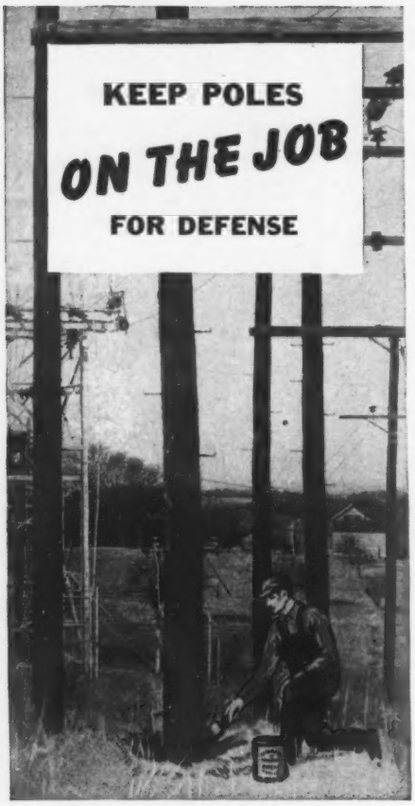
AMERICAN BRIDGE COMPANY

General Offices: **Frick Building, Pittsburgh, Pa.**

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit · Duluth
Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL



● Osmoplastic treatment prevents groundline decay thus increasing standing pole life.

In these critical times, it is important that poles keep standing longer to avoid power failures. You can guard against pole failures due to groundline decay by using the Osmoplastic groundline treatment. This easy to apply wood preservative increases standing pole life by 7 to 10 years. In addition, frequent pole inspection is eliminated. Osmoplastic groundline treatment is economical, too. Service records of over 60 leading utilities compiled from over a million Osmoplastic treated standing poles prove Osmoplastic pays. Make inspection time Osmoplastic time for lowest cost pole protection.

SEND coupon below for full information

OSMOSE
WOOD PRESERVING COMPANY
Buffalo, New York

Osmose Wood Preserving Company
Buffalo, New York
Please send me complete data on the Osmoplastic groundline pole treatment.

Name_____

Company_____ Title_____

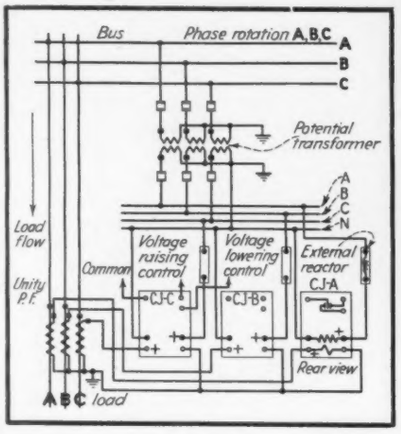
Address_____

City and State_____

is able to maintain closer voltage regulation.

With this design, the time delay is inherent in the relay and occurs before the primary relay itself closes contacts rather than after contacts are closed. Thus, the need for an external timer is eliminated and wear on contacts and moving parts of the relay is greatly reduced, since contacts close only when actual operation of main regulator is to be initiated.

The construction of the relay utilizes a moving contact floating between two stationary contacts and the moving contact changes its position continuously in accordance with load center voltage changes. This gives the relay a cumulative or integrating property. That is, whenever the mean load center voltage is outside the limits set the relay operates. This enables the new relay to hold voltage closer to a desired value than older



EXTERNAL connections of voltage-regulating relay
Potential transformer may be part of regulator, with relative instantaneous polarity as shown and when unity power factor load increases, the contact moves to left to close between terminals 2 and 1.

designs which do not have this integrating property. Also, the relay does not respond to line voltage fluctuations of negligibly short duration.

Another feature of the new voltage-regulating relay is the line-drop compensator. Unlike older designs, this is an integral part of the relay proper and is set by use of a single knob which controls a potentiometer type rheostat. The relay automatically compensates for power factor and magnitude of the load, on a wide range of lines, when the compensator is set properly.

The relay contacts are provided with arc suppressors to limit contact arcing. With these in use the relay

L-M Connector now stronger than ever

The L-M Connector is better now than ever. Its body of a new cast bronze alloy, machined all over, gives exceptional high strength and adds years of usable life.

Accurate overall machining results in perfect threads which give remarkably high pressure contact between conductors with low applied wrench force. Machining also gives the smooth surfaces and rounded corners which protect the conductor and make the connector easy to handle. The wide surfaces and V groove pad insure good current carrying capacity and prevent slippage.

On your next order specify L-M Connectors.

LINE MATERIAL CO.
MILWAUKEE, WIS.

has successfully passed accelerated life tests equivalent to more than ten years of normal operation.

•

Nitrogen Locates Leaks in Underground

Checking transformer and other underground equipment to make sure it is watertight is good preventive maintenance, especially in river-level districts. Use of nitrogen under a positive pressure is one of the best ways of determining whether any leaks exist. Shown here are some of the steps in an inspection of underground equipment on the New York Power & Light System.

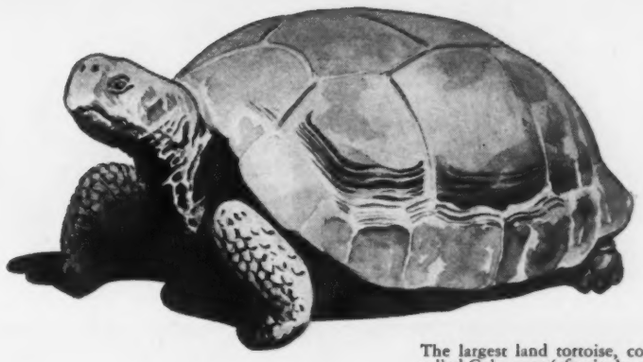
General Electric Photo

FROM a bottle on the street, nitrogen at four pounds pressure is admitted to the transformer in the manhole

General Electric Photo

DOWN BELOW, a gage on the transformer connection indicates any leaks

Presence of pronounced leaks will be revealed by a rapid drop in pressure. Gaskets and fittings are painted with soapsuds and bubbles show up any leaks too small to cause a telltale pressure drop at the gage.



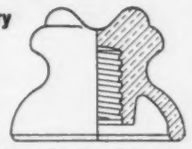
The largest land tortoise, commonly called Galapagos (after its home in the Galapagos Islands) lives, sometimes, in excess of 100 to 150 years.

Even if he lives to be 175...A Hemingray Glass Insulator Can *Outlive Him*

Three reasons for the long life of Hemingrays. First, the "secret" glass batch-mix—climax of 87 years of experience. Second, Owens-Illinois "quality" production control. This results in insulators without voids, stresses or strains—so homogenous that they are impervious to moisture-penetration and operating temperature changes. And third, the fact that time does not affect their structure. You could remelt a 100-year-old Hemingray glass insulator and make it into another insulator which in turn, would last another 100 years. Cost, low to begin with—*lower* in service life. Hemingrays sold *only* through jobbers.

30 Hemingrays Ready to Solve Your Inter-Plant Problems

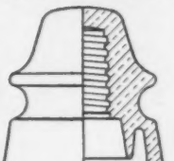
10 Hemingrays for Primary Power Distribution



From this group you can choose Insulators with the following range of characteristics:—

• *Critical Impulse Flashovers* ranging from 75 to 120. • *Leakage Distances* ranging from 4 to 9½ inches. • *Dry Arcing Distances* from 2⅜ to 4⅝ inches. • *Wet Arcing Distances* from 1 to 1¾ inches.

5 Hemingrays for Your Signal Work



From this group you can choose Insulators with the following range of characteristics:—

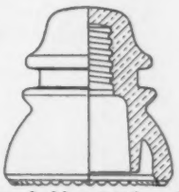
• *Heights* ranging from 3-13/32 to 4 inches. • *Diameters* ranging from 2¼ to 3¼ inches. • *Groove Diameters* ranging from ⅜ to 11/16 inches. • *Thread Diameters* standard at 1 inch in all 5 numbers.

10 Hemingrays for Secondary Power Distribution

From this group you can choose Insulators, Knobs and Spools with the following range of characteristics:—

• *Heights* ranging from 2-15/16 to 5-1/32 inches. • *Diameters* ranging from 2¼ to 3¼ inches. • *Groove Diameters* ranging from 1 to 2 inches. • *Thread Diameters* at 1 inch in all 10 Numbers.

7 Hemingrays for Telephone and Telegraph



From this group you can choose Insulators with the following range of characteristics:—

• *Heights* ranging from 2-13/16 to 4-9/32 inches. • *Diameters* ranging from 2-7/16 to 3¾ inches. • *Groove Diameters* of either 7/16 or ⅜ inches. • *Thread Diameters* standard at 1 inch in all 7 numbers.

RUSH DELIVERY IF YOU NEED IT!

Complete stock of *all* types of Hemingrays are on hand. You can order as many or as few, as you need. Just 'phone your jobber. He can arrange *immediate* shipment.

USE COUPON FOR CATALOG

OWENS-ILLINOIS Company, Muncie, Indiana
Hemingray Division

Please mail a complete Hemingray Insulator Catalog.

Name_____

Street and Number_____

City_____ State_____

OWENS-ILLINOIS

HEMINGRAY DIVISION • MUNCIE, INDIANA

HEMINGRAY Power, Telephone and Telegraph Insulators

IMPROVED

Skilled hands depend almost entirely on eyes for guidance. That's why hands work faster and produce more with greater accuracy and safety when quality lamps make seeing easier. To make sure you get the utmost in lamp economy — brightness, long life, low cost—look for the "Westinghouse Mazda" trade mark on the lamps you buy.

It's WESTINGHOUSE *for better light at lower cost*

in all 3!

1. Brightness

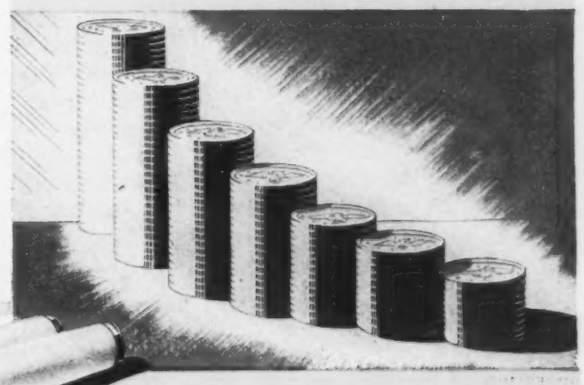
Through intensive research ever since fluorescent lamps were first introduced, Westinghouse has increased lamp brightness. This more-light-for-your-money advantage has been accomplished in many ways, for example: by making fluorescent powders which glow more brilliantly; by rigidly controlling thickness of the powder coating; by making lamps stay bright from end to end.

2. Long Life

Today's Westinghouse Mazda Fluorescent Lamps have a rated average of 2500 hours, or 1000 hours longer than the fluorescent lamps of four years ago. Westinghouse research achieved this advantage by many new developments, including improved electrode design; better control of gas pressure inside the lamp; and by perfecting the method and machines which insert the mercury into the lamp.

3. Low Cost

While many Westinghouse technicians were improving lamp quality, others were developing highly accurate mass production machinery to reduce lamp prices. As a result, Westinghouse Mazda Fluorescent Lamps are precision built to the most exacting limits, and now sell at the lowest prices in history. A 40-Watt Westinghouse lamp that formerly listed for $2.80 now lists for only 95 cents!



Westinghouse
MAZDA LAMPS

LOAD SERVICING

Industrial • Commercial • Rural • Residential

BALANCED DIETS for war workers emphasized at fair display

Utility Stresses Food Economies

Restricted markets for electrical appliances and wiring have led the Brockton (Mass.) Edison Company to devote increasing attention to customer service problems under war conditions, and at the annual Brockton Fair special emphasis was laid this year upon the economical preparation and use of foods for families, many of whom list active war industry workers in their membership. The home service department, in charge of Miss Janet E. Bolles (right center in dark dress), with the cooperation of the Westinghouse company and the John Wood water heater plant (Conshohocken, Pa.) exhibited electric ranges and heater equipment, with charts of vitamin importance and budgeted foods with hints on proper cooking to avoid loss of values through over-use of water.

Recipes were distributed for low-sugar desserts, with a guide to oven canning and timetables for fruits and vegetables. "Reddy Kilowatt" was enlisted to feature the making up of "peppy" lunches for war workers including hot dishes and liquids maintained in thermos bottles in addition to the usual sandwiches, supplemented by raw vegetables, salads, fruits and desserts in whose make-up electric refrigeration plays an important part.

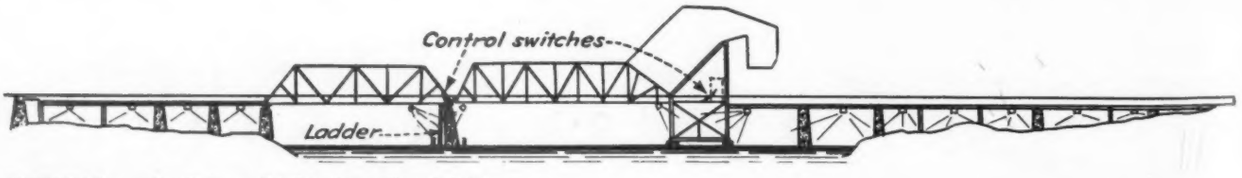
Merchandising continues under wartime regulations, but as the limited stocks of equipment diminish, the service angle must be stressed, and more emphasis laid upon keeping existing appliances, many of which effect worth-while fuel savings, in economical use. As in other utilities, this means close attention to proper handling and maintenance. A. J. Williams is in charge of the sales department.

•

Railroad Bridge Protective Lighting

Plan for anti-sabotage lighting of a two-span railroad bridge and approaches, as shown in the accompanying illustration, was worked out, upon the suggestion of the U. S. Coast Guard, by Paul Marble and Joseph Flynn, lighting specialists of the Puget Sound Power & Light Company. They, accompanied by an electrical engineer of the railroad company, made a survey of the conditions, then drew up and presented the recommendations as indicated in the sketch.

Pointing out that illumination under the bridge at both approaches would assist guards in preventing trespass, the engineers suggested that 200-watt lamps in RLM reflectors be installed in the center of each bay. They suggested also that the ground under the approaches be leveled off



SCHEME for anti-sabotage lighting for railroad bridge

How The Lighting Industry is Meeting a Challenge!

THE lighting industry today is meeting the challenge of increasing night production to the level of daytime production. In many converted war plants, here is what happens on the "after dark" shift:

1. *Rejects are higher.*
2. *More material is wasted.*
3. *Fatigue increases faster.*
4. *Accidents are more numerous.*
5. *Quality of work is poorer.*
6. *The production rate is lower.*
7. *The number of employees who fail to show up for work is larger.*

Basically, in practically every plant where these things occur, the cause is poor lighting. Whereas day shifts enjoy the benefits of both daylight and artificial illumination, after-dark shifts depend on artificial lighting alone . . . and in most converted war plants, the existing lighting systems were designed primarily to supplement daylight. They were not meant to provide the necessary seeing light for the type of prolonged work that now goes on all through the dark hours.

GLARE

WHAT'S WRONG WITH THE LIGHTING?

In plants where lighting surveys have been made, three types of "lighting bottlenecks" are most prevalent:

1. Glare is one of the most frequent difficulties. Often it is even worse at night because contrasts are greater.

2. Shadows are another bad offender . . . shadows that hide details, create false conclusions, and conceal hazardous conditions.

3. Insufficient light the third trouble, is frequently caused by improperly placed lighting fixtures, by dirt and dust on lamps and fixtures that reduce their efficiency as much as 50%, or by use of wrong size lamps.

SHADOWS

WHAT CAN BE DONE ABOUT IT? Many of these converted plants realize their lighting is inadequate but don't realize how simply and inexpensively it can be improved. Many of them are amazed when lighting men show them how even a few simple changes (see box) provide the better light they needed.

To increase the production ratio on night shifts is, in effect, the equivalent of putting more factories to work to speed the war effort . . . and at infinitely less cost.

INSUFFICIENT LIGHT

The lighting industry is meeting this challenge to help end the war sooner by breaking many of the production bottlenecks caused by poor lighting.

Toward this end, General Electric lighting men gladly pledge their time, skill, and experience . . . remembering that their job is *not to sell, but to serve.* General Electric Company, Nela Park, Cleveland, Ohio.

SIMPLE THINGS LIKE THESE ARE INCREASING LIGHTING EFFICIENCY. . . STEPPING UP NIGHT SHIFT PRODUCTION!

1. Have a regular cleaning schedule for bulbs and fixtures.
2. Make sure right size bulbs are used in present fixtures.
3. Relocate present lighting to fit new demands.
4. Add supplementary lighting for the most critical seeing operations, such as inspections.
5. Re-paint walls a light color to reduce light absorption; paint machinery a light color to increase visibility.
6. Make frequent light meter checks on maintenance.
7. Recommend new lighting equipment *only* when it is essential.

G-E MAZDA LAMPS

GENERAL ELECTRIC

Mr. Wartime Lighting Counselor:

WAR PLANTS GET THE LIGHT THEY NEED - - - WHEN YOU

Plan and Specify

Guth FLUORESCENT

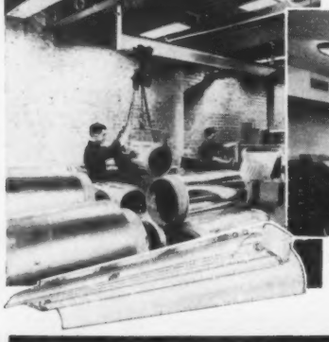
You are performing a tremendous service for America by helping get the utmost production out of War Plants with the aid of better lighting. Your plans are carefully developed and properly engineered. By specifying Guth Engineered Fixtures, you insure ultimate lighting results from your layouts.

Our 40 years of experience have built quality and dependability into every GUTH Fixture—and our production methods meet today's demands for prompt shipment on orders of 1 to 1000 units.

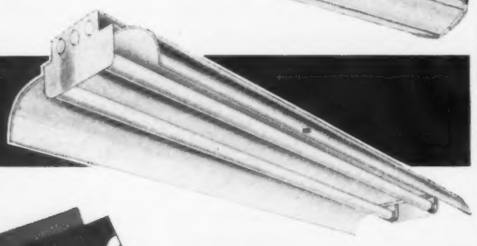
Write for New Literature to get better acquainted with GUTH Products.

For FACTORIES. GUTH Engineered Fluorescent provides quick, easy seeing for accurate work. In the installation pictured at left, color matching and close inspection are quickly and successfully done under 30-32 foot-candles at floor level.

For OFFICES AND DRAFTING ROOMS: It's equally important to have good lighting where production is started and controlled. There's a GUTH Unit for every need. In the installation below, shadows are minimized; and in spite of the low mounting level, direct glare is practically non-existent.



Non-Metallic Reflectors Save Vital War Materials



The new GUTH Mazelite reflector is made of pressed-wood instead of steel, releasing tons of metal for war equipment! The larger "reflector-mouth" and GUTH "300° white" enamel finish produce greater light-output.

FORTIETH YEAR OF Guth LIGHTING LEADERSHIP

THE EDWIN F. GUTH CO. • 2615 Washington Ave. • St. Louis, Mo.

and cleared of brush, shacks and boat shelters so as to give the guards clear view.

All of the piers, except two, were considered to be unscalable and massive enough to be unsusceptible of easy damage. One exception was the center pier, which has a necessary ladder fixed to it. The other is where the metal structure of the bridge at the hinge point extends down to near water level. At each of these four 150-watt reflector flood lamps to illuminate the four sides of the piers were suggested. Control for all the lights would be located as shown on the sketch.

•

Home-Drying Fruits and Vegetables

By L. W. GRAY
Manager, Rural Sales Division, Georgia Power Company

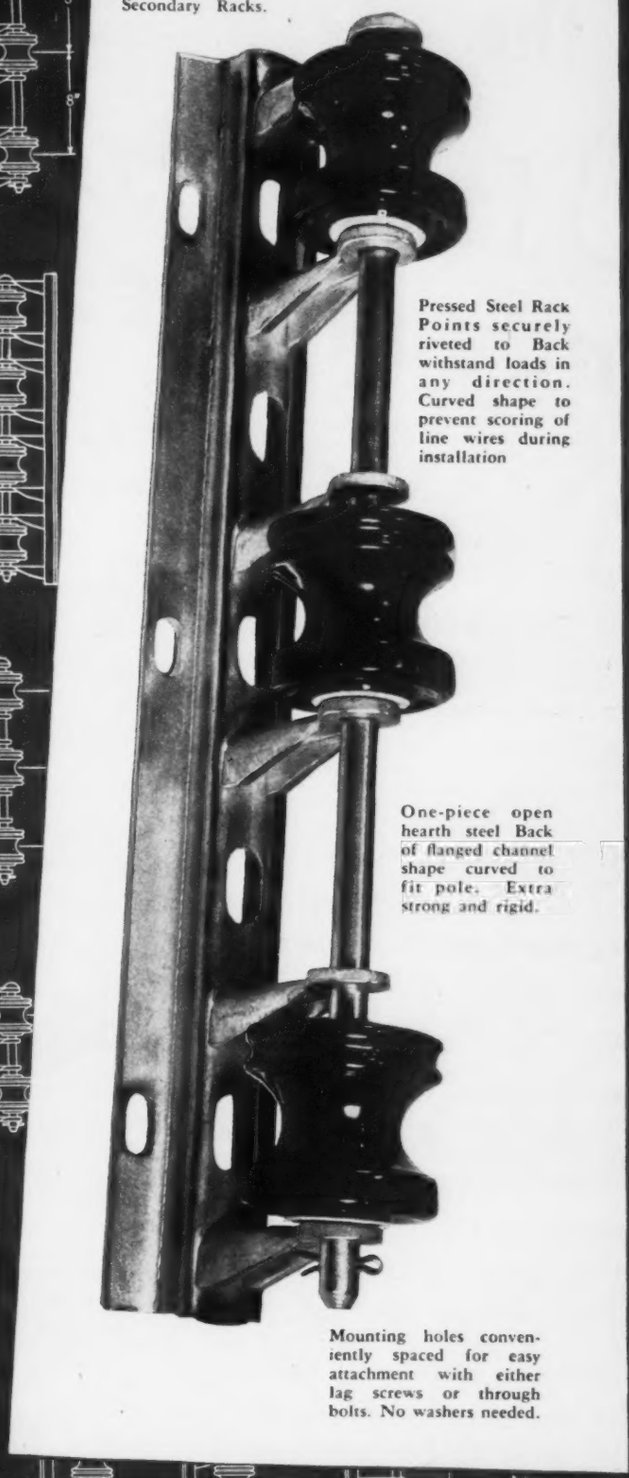
Dehydration of fruits and vegetables has recently received considerable attention and much thought has been given to it as a means of preserving and storing a large part of the nation's food supply. This appeared to the rural sales division of the Georgia Power Company to be an excellent opportunity for enlarging the service aspects of its activities in the face of the rapidly decreasing availability of merchandise for sale.

Drying of fruits and vegetables is no new idea by any means as many of us will remember the sun-dried products that required several days of sunning and protection against the elements during the drying period. The state agricultural extension service recommended a home-made domestic dehydrator with electrical heating units, or electric bulb substitution as a heat base, which is proving thoroughly practicable and serviceable. These small units hold around a bushel of fruit or vegetables which can be dehydrated in a few hours and can be made up for a very nominal cost.

Rural sales engineers of the company are now energetically promoting the idea of dehydration in their respective divisions. More than sixty of these small domestic units have been made up, and Albert Ergle of the Augusta division and Comer Renfroe of the Macon division of the company have been instrumental in placing them with vocational schools,

. . . from the
COMPLETE LINE OF
OLIVER
Pole Line Materials

Strain-tested and Service Proved
OLIVER SECONDARY RACKS

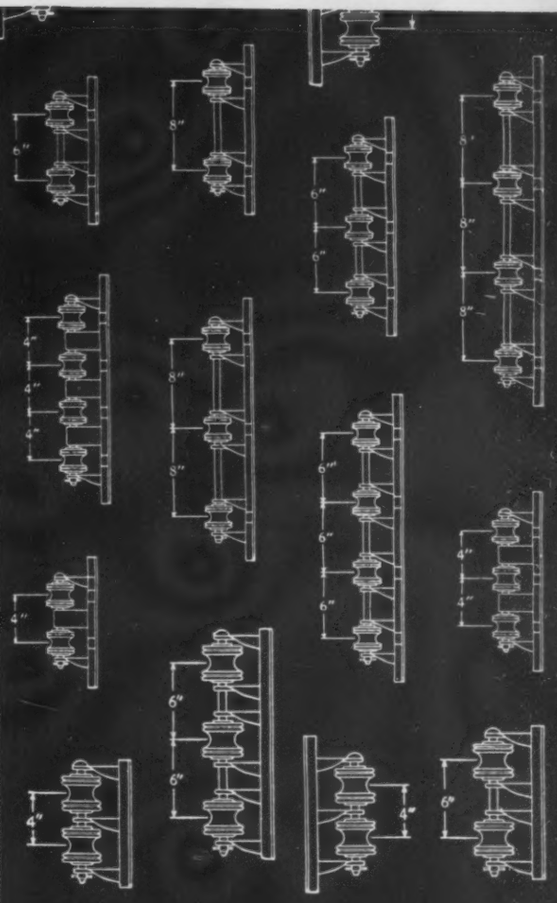


Hot-dip Galvanizing protects Oliver Secondary Racks.

Pressed Steel Rack Points securely riveted to Back withstand loads in any direction. Curved shape to prevent scoring of line wires during installation

One-piece open hearth steel Back of flanged channel shape curved to fit pole. Extra strong and rigid.

Mounting holes conveniently spaced for easy attachment with either lag screws or through bolts. No washers needed.



TWO outstanding features of Oliver Secondary Racks are exceptional mechanical strength and complete protection against corrosion. Coupled with the fact that the Oliver line includes sizes and types for all classes of service, it is easy to see why Oliver Secondary Racks are the choice of experienced operators everywhere.

OLIVER
IRON AND STEEL
Corporation
Makers of Pole Line Materials
Since 1894
PITTSBURGH, PA.

COOPERATING IN WAR PRODUCTION

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

When you plan war jobs make the most of these FLEUR·O·LIER advantages

BUILT TO DEFINITE STANDARDS These fluorescent lighting fixtures—FLEUR-O-LIERS—are built to 50 definite standards, set up by MAZDA Lamp makers, to protect users—assure satisfactory service and maximum light from their lamps. They're made by over 40 leading fixture manufacturers.

TESTED! Independent experts—Electrical Testing Laboratories of New York—put random samples of every size and design through exacting tests—determining their fitness to withstand tough, day-and-night war plant use.

CERTIFIED! All fixtures meeting these tests are so Certified by Electrical Testing Laboratories—and thus win the right to wear the FLEUR-O-LIER Label of Certification. This means not only certification of fixture assembly but also of every component part, including auxiliary equipment, ballasts and starters.

GUARANTEED! All FLEUR-O-LIERS carry the Fleur-O-Lier Manufacturers' 90-day guarantee. Every step in the production of a FLEUR-O-LIER fixture is added protection for you and the war plant you help to light.

Certified
FLEUR-O-LIER
The Manufacturer guarantees by affixing this label that this Fluorescent Luminaire is a duplicate of samples found by periodic examination to comply with the minimum requirements as set up in the
"SPECIFICATIONS FOR LUMINAIRES, FITTINGS AND AUXILIARIES FOR FLUORESCENT LAMPS"
which are sponsored by the Manufacturers of Mazda Lamps.
Electrical Testing Laboratories, Inc.
NEW YORK, N. Y. 6-42
E·T·L
A COPY OF THIS CERTIFICATE SHOULD APPEAR UPON EACH UNIT OR PACKAGE
E·T·L
FLUORESCENT LIGHTING FIXTURES EMPLOYING EXISTING TYPES OF LAMPS ARE NOT RECOMMENDED FOR SCHOOLS, OFFICES AND SIMILAR LOCATIONS UNLESS LAMPS ARE SHIELDED FROM DIRECT VIEW.
THIS CERTIFICATION IS CONTINGENT UPON EMPLOYMENT OF CERTIFIED AUXILIARIES OF OVER 85% POWER FACTOR
Certified FLEUR-O-LIER

For war plants . . . large or small . . . FLEUR-O-LIER dependability counts!

- **Certified starters and ballasts** . . . assuring balanced operation—high power factor.
- **Durability and safety** . . . electrically and structurally sound.
- **Ease of maintenance** . . . easy to clean and re-lamp.
- **Maximum light output** . . . Certified control equipment plus high reflection factor assures efficient light from the lamps.
- **Flicker correction** . . . on circuits of two lamps or more.
- **Correct ventilation** . . . no danger of overheating in control unit.
- Every unit carries the FLEUR-O-LIER Manufacturers' Guarantee.

A vital tool in wartime production, fluorescent fixtures now require a suitable WPB priority rating. Any FLEUR-O-LIER Manufacturer will be glad to work with you on this to get the best lighting possible. FLEUR-O-LIER Manufacturers, 2126-10 Keith Bldg., Cleveland, Ohio.

FLEUR·O·LIERS

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements.

Splice it with

FARGO "the sure splice"

1 Four-Jaw gripping unit holds solid and stranded wires in permanent, slip-proof grip.

2 Safety Zone holds burred end wires safely clear of gripping jaws —no chance for slipping.

3 Side-wall Release admits a plain screw driver tip for easy release of conductors. No nails nor gadgets needed.

4 Sag Guide shows how much wire goes into the splice, tells you how much wire to cut off for the desired sag.

Use the FARGO LINE SPILCE, "the sure splice"

Made by FARGO MFG. CO.
Distributed by

LINE MATERIAL CO.

MILWAUKEE, WIS.

GEORGIA POWER's Albert Ergle and his home-made dehydrator. Screen-bottom trays hold the product being dried. Heat is supplied by nine 100-watt lamps; induced draft by the fan at the top

agricultural county agents and farmers for demonstration purposes. The activity is also being rapidly organized by the four other divisions of company, in which some dozen or more are now under construction.

At the demonstrations dehydrators were fully explained as to construction and operation and samples of the finished product were distributed for inspection. The process of dehydration was gone into fully and the proper use of dehydrated foods explained. These demonstrations have proved very popular and requests have come in for many more of them.

•

Quarterly Meter Reading Plan

An estimated annual saving of 173,000 vehicle-miles and 11,500 gal. of gasoline, with a reduction in automobile requirements from 33 to 15 cars, is anticipated from a revised program of meter reading on the Connecticut Light & Power Company's system scheduled to begin September 27. The plan supersedes the previous monthly reading and applies to all residential, small and medium commercial, and some seasonal residential customers in all cities and outlying areas. Customers will continue to receive monthly bills based either on actual readings or on average energy

MAILING LISTS THAT WORK...

McGraw-Hill Industrial Mailing Lists are a direct route to today's purchase-controlling executives and technicians in practically every major industry.

These names are of particular value now when most manufacturers are experiencing constantly increasing difficulty in maintaining their own lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance during this period of unparalleled changes in industrial personnel. These lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nation-wide field staff, and are maintained on a twenty-four hour basis.

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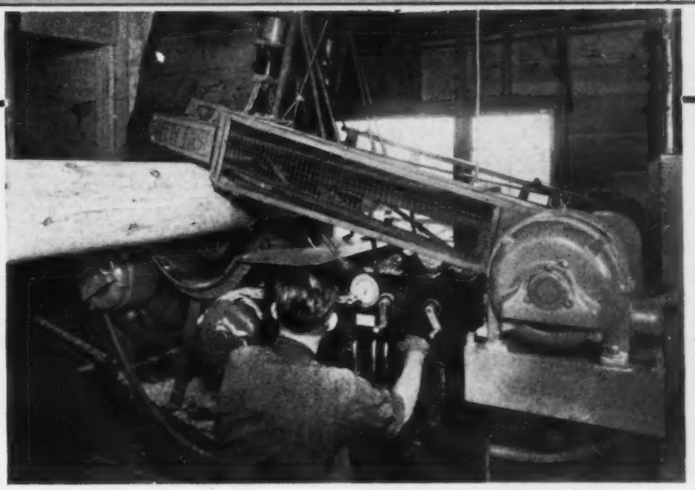
consumption, the figure being employed for average bills being based on the three months previous actual use.

In a typical case, the customer receives a bill in October for 100 kw.-hr. This is the actual consumption, since the meter was read for that period. In November he will receive an average bill, say for 110 kw.-hr. In December he will receive another average bill, possibly for the same amount. Again in January, however, he will be billed for the actual amount of energy consumed, since his meter is read for three months. As explained to customers in a notice mailed them in September, this typical case is assumed to have a meter reading of 5,612 for the month ending October 1 and 5,947 for the month ending January 1. The total measured energy consumption for the quarter is 335 kw.-hr., and the sum of the November and December meterless billings is 220 kw.-hr., leaving 115 kw.-hr. to be made up on the January billing.

For customers who prefer to have their bills figured monthly from actual readings, the option is given of reading their own meters on the usual reading date, filling out and mailing postcards which may be obtained from the company.

The estimated annual savings to the company will be about $66,000. Under the proposed federal tax bill, $59,400 of this amount will be paid to the United States in increased taxes, leaving only $6,600 to meet other increases in operating costs. If this net saving were all that could be accomplished under this plan, the company states that it would not undertake the change, but the economies in materials vital to the war effort—tires, automobiles, gasoline and manpower—are much more significant than the amount of money indicates. Already the company has had to "gang up" on service calls, as it puts it, and gratifying co-operation from customers is being received. The quarterly meter reading plan is emphasized as simply a further step in this direction of co-operating with the government in the conservation program. It is estimated that the 18 automobiles required will have to cover 173,000 car-miles and consume 11,500 gal. of gasoline per year, compared with 346,000 car-miles and 23,000 gal. for the previously required 33 cars.

FULL LENGTH *Machine Shaved*
FULL LENGTH *Treated*



BELL *Long-Life* CEDAR

averages more than 20% higher than approved strength specifications . . .

To give you stronger, longer lasting, better appearing poles that save you maintenance money, BELL uses a dependable performing shaving machine that (1) rounds and smooths the pole (2) takes off excessive sapwood (3) removes bulging knots (4) prepares pole for full length treatment in new full-length dipping vats.

Also, a BELL incising machine spreads the fibres at the ground line area so that the butt receives maximum sapwood penetration with No. 1 A.W.P.A. creosote oil.

An added factor in BELL quality is that BELL poles come from Selkirk Range high altitude cedar timber. Every process in BELL pole production is done by skilled workmen under careful supervision.

Specify BELL Long-Life Cedar. We have a 50-year background in the production, manufacture, and distribution of cedar poles.

Write for a copy of our Cedar Pole Data Book and Pole Class Calculator.

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MINNEAPOLIS, MINNESOTA

** Buy United States Government "attack" bonds today for the sake of your dollars tomorrow*

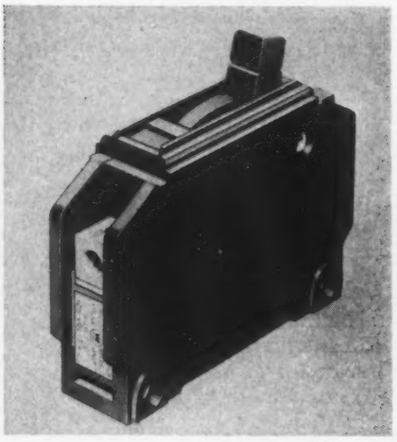
BELL 1942 LBR. & POLE CO.

BELL WESTERN RED Cedar NORTHERN WHITE

NEW EQUIPMENT

Breaker

New breaker, which offers faster opening action on short circuits and full-time delay on overloads, combines in a single unit a cooperative thermal-magnetic trip action. Available in ratings of 15, 20, 25 and 35 amp., single pole only, 125 volts, a.c.



"Quicklag" De-ion breaker for lighting and appliance circuits. **Westinghouse Electric & Manufacturing Co.**, East Pittsburgh, Pa.

•

Control Unit

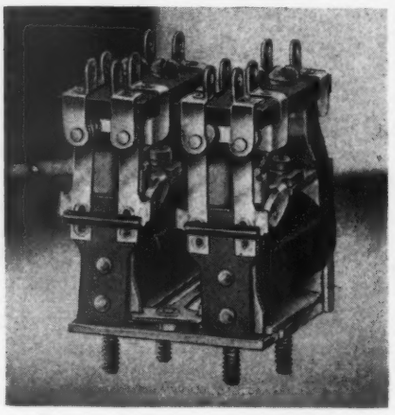
New remote-control unit, designed to increase weld qualities and to eliminate weld craters, is protected from accidental breakage by a metal pull-out handle set over the control dial and by cushion springs on the back of the porcelain rheostat. Device makes it possible for welding machines to be compactly located near the ceiling to conserve floor space, while operators below use the remote control for fine current settings. Large outer control dial.

"Multi-Range Dual Control Dial" for all Hobart welders. **Hobart Brothers Co.**, Troy, Ohio.

•

Latching Relay

Relay which locks mechanically in either position so that only momentary current needs to be applied to the coils meets Army, Navy and C.A.A. specifications. The device is four-pole, double-throw, maximum rating, 5 amp. per contact—non-inductive and available for a.c. or d.c. Weight is 7 oz. and size $1\frac{13}{16}$ by $1\frac{5}{16}$ by 2 in.



"8JU" aircraft relay. **Allied Control Co.**, 227 Fulton St., New York, N. Y.

•

Welding Electrode

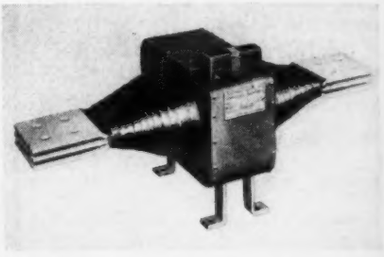
New A.C. electrode, available in diameters of 1/16-in., 3/32-in., 1/8-in. and 5/32-in. **Wilson Welder & Metals Co.**, 60 East 42d Street, New York, N. Y.

Designed specifically for all-position welding of mild steel with a.c. type welding machines, new welding electrode complies with all requirements of the American Welding Society Classification E-6011.

BUYING ELECTRICAL EQUIPMENT?—McGraw-Hill's *Electrical Buyers Reference* is a convenient place to look first for manufacturers' product data, names and addresses.

Current Transformer

New indoor current transformer, smaller in size than the type KC-51 it supersedes, thus requiring less mounting space, is stated to be ideal for relay applications, as well as for metering service. The impulse strength of these units meets the test requirements for 95 kv., full-wave, on both insulation and flashover (ASA standard for 15-kv. instrument transformer).



"Type JK-9" indoor current transformer, rated 15 kv., 1,000 to 4,000 amp. **General Electric Co.**, Schenectady, N. Y.

•

Transformer Welder

Increased efficiency and speed in welding heavier, thicker metals is claimed for a new alternating-current welder which features an electric circuit arrangement that produces the proper voltage for every current setting. In the new welder the transformer and reactor are built as an integral unit. The reactor coils around the air gap,

Heavy-duty a.c. welder; available in capacities from 200 amp. to 600 amp. **Allis-Chalmers Manufacturing Co.**, Milwaukee, Wis.

SILHOUETTES
in the night

Two silhouettes against the glowing sky, so similar in appearance and purpose, yet so vastly different in character.

The one is a factory, with chimneys belching smoke and fire, evidence of the productive energy beneath, working night and day to feed the cannons of our fighters.

Much more difficult a task, with many lives held in the balance, is that of the men behind the gun. Every flash, every rumble echoes a unity of purpose supported by the greatest single group in the history of the world. One object! Simply stated, but of colossal import. "Win the war!"

Two silhouettes against the sky. One is a symbol of the country's productive effort of which you and we are a part. We are pleased to place our facilities completely at the disposal of our government. We are proud that it is in our power to help the boys whose forms are outlined in that other silhouette.

"HANG THE LOAD ON HUBBARD HARDWARE"

HUBBARD AND COMPANY

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Everlasting
Fastenings
BRASS
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MONEL
STAINLESS
Harper's Fastenings are fighting the Axis and fighting corrosion. They are being used on a multiplicity of war equipment . . . such as ships, planes, guns and tanks . . . because they successfully defy rust, corrosion and other tough conditions. Practically speaking, they are "Everlasting."
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. . . of bolts, nuts, screws, washers, rivets, and accessories in the non-ferrous and stainless alloys. Many are "hard-to-get." Specials manufactured to order. 4-color illustrated catalog free to executives.
The H. M. HARPER COMPANY, 2611 Fletcher St., Chicago; 45 W. Broadway, New York City.
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EVERLASTING FASTENINGS

eliminating the magnetic flux. This arrangement is claimed to provide continuous control from 35 to 250 amp.—a safe, high, open-circuit voltage at low current where a.c. welding was previously most difficult and a lower open circuit voltage at higher current where efficiency and power factor are all important. Striking characteristics are improved and size and weight is reduced, it is claimed. Welder is without flux, taps or switches of any kind. Manual control covers the welding range from maximum to minimum settings with less than a dozen turns of the control handle.

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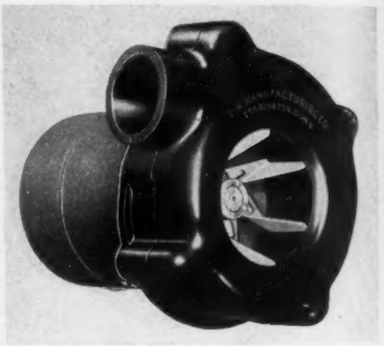
Blower

New device, designed to fulfill blower function under the difficult conditions of restricted space and high temperatures imposed by electronic equipment, is inherently



"No. 2 Blower" wheel and housing. L-R Manufacturing Co., Torrington, Conn.

flexible and may be adapted to uses where compactness is vital, it is claimed. The blower, housed in high impact plastic, has an output of 60 c.f.m. at 7,500 r.p.m. and may be driven by any 1/100-hp. motor.

•

Paper Fabric

"Aqualized" paper, available in several types, from highly absorbent to water repellent. Brown Co., 500 Fifth Avenue, New York, N. Y.

New paper may be used as a substitute for cloth and burlap; uses no surface coating, but has an inherent wet strength all through the sheet. Useful for sandbags and camouflage.

•

Correction

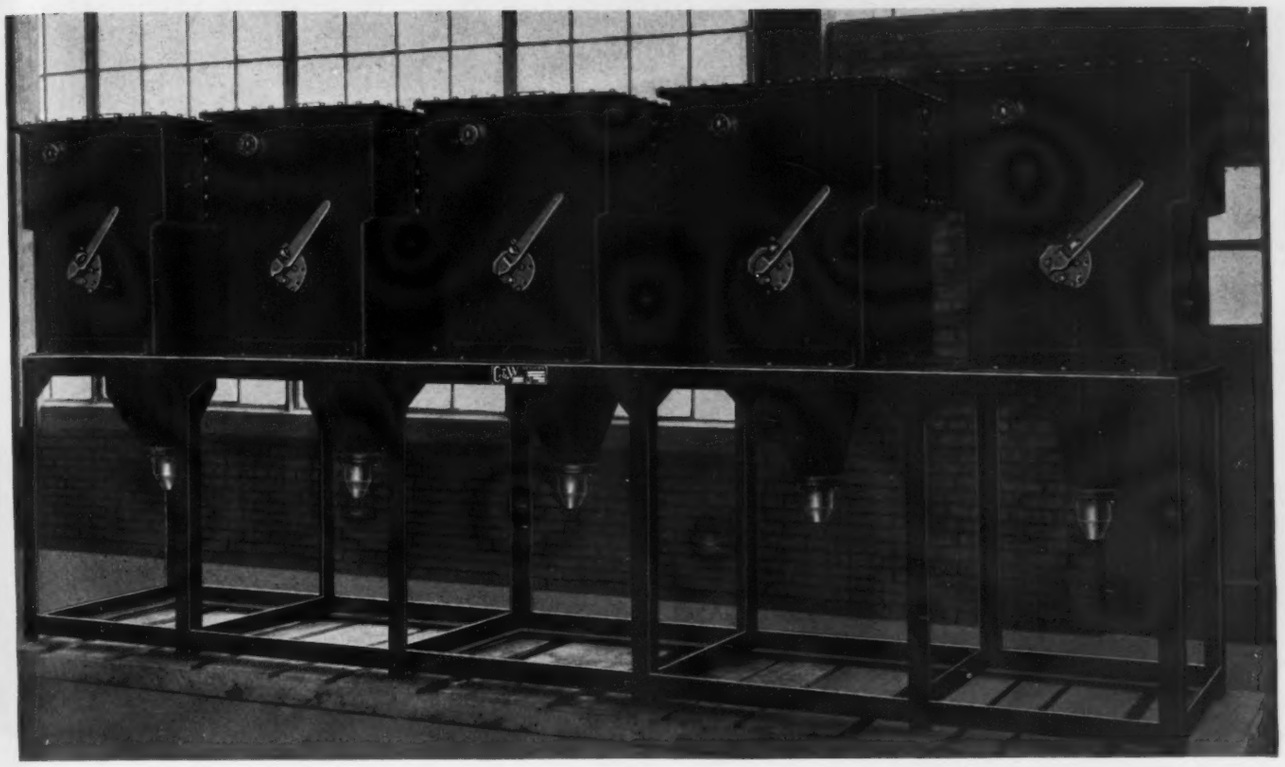
The cooling system described on page 120 of the October 3 issue of ELECTRICAL WORLD is a product of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., whose address was incorrectly given as East Palestine, Ohio.

•

Thermostat

"DSK Series" Duplex thermostat. George Ulanet Co., 92 E. Kinney St., Newark, N. J.

Actually two thermostats in one, this compact, sturdy unit can be connected as two single-pole, single-throw switches or as one single-pole, double-throw switch. Recommended electrical rating is 500 watts non-inductive load at 115-230 volts a.c. Each thermostatic element is independently adjusted by its respective adjusting screw provided on the mounting bracket. Temperature ranges are 300, 450 and 700 deg. F.



34500 Volt Oil Switch

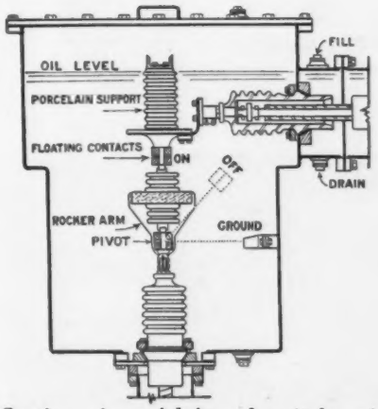
sectionalizes 5 three phase cables. Two feeders and three branches connected to a common bus.

A large shipbuilding and dry dock company required a large amount of power to carry on its activities. They secured electric service at 22,000 volts from a utility company who brought two circuits into the shipyard.

The actual load centers were widely separated hence it was decided to terminate the utility company's supply circuits at a central location and branch out from there to unit substations in different locations. At these substations the circuits are stepped down from 22 Kv to 4 Kv. A 4 Kv underground cable system was laid out in radial circuits with facilities for interconnecting the circuits into loops, using G&W Type "FCBX" oil fuse-switch boxes for sectionalization and protection.

G&W 34.5 Kv Type "RA" oil disconnect units are used for sectionalizing the shipyard's 22 Kv branch circuits from the mains supplied by the utility company's two incoming circuits.

The section view shows the left-hand end switch unit. The middle switches have horizontal bus connections in both directions. The cables are terminated in the compound filled potheads on the bottom. Each cable can be independently connected to the bus, to the open position, or to ground. The operating handle can be padlocked in any of the three positions.

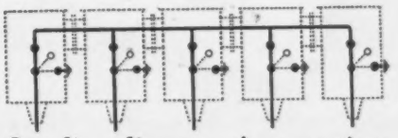


Section view of left end switch unit.

The switching links are encased in porcelain bushings mounted in a wood strap attached to rocker arms pivoted in line with the lower contacts. The links have full floating contacts at each end. The operating shaft is sealed with a rotary oil seal.

The upper stationary contacts are mounted on the inverted porcelain supports and connected to the busses with flexible copper braid. The busses have separable connectors within the horizontal porcelain bushings — for convenience in making the mechanical interconnections of the switch units. The pothead and bus porcelain insulators are identical—unit detachable style. The bus compartments are filled with oil rather than compound.

The initial installation of the 5 unit switch assembly proved so satisfactory that additional installations of several 3 unit assemblies were made to take care of expanding facilities. Consulting engineer, James M. Todd, Citizens Bank Bldg., New Orleans, La.



One line diagram of connections.

G & W ELECTRIC SPECIALTY CO.

Cable Terminating, Sectionalizing and Protecting Equipment

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Also made in Canada by Powerlite Devices, Ltd., Tor.

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Acceptance of alternates by the purchaser has enabled us to fill many emergency orders promptly.

Perhaps we can do likewise for you.

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For Example–
Accept THIS–
Instead of THIS–
IRON AND STEEL ARE DESPERATELY NEEDED!
Throw Your Scrap into the FIGHT!

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ELECTRIC WIRES AND CABLES

TECHNICAL LITERATURE

ARCHITECT-ENGINEER DATA BOOK—States field of application, lists significant features and presents skeleton specification drafts for stokers, turbines, generators, steam condensers, ejectors, evaporators as well as such electrical equipment as switchgear, unit substations, panel assemblies, bus duct distribution, load centers, motors and instruments, lighting and elevators. Twenty pages of compact engineering data in appendix. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

RESIN—Physical and chemical properties of a typical sample, miscibility characteristics and compatibility of waxes are among the data presented on Staybelite resin in an eight-page booklet issued by the Naval Stores Department, Hercules Powder Co., Wilmington, Del.

OPEN WIRING—For both flat and triangular construction of conductor runs in industrial plants formulas and tabular data covering voltage drop and determination of cable sizes as well as use of multiple conductors are included in an article "Open Wiring Speeds War Production" in the August 1942 issue of Delta-Star magazine; copy obtainable from Delta-Star Electric Co., 2400 Block, Fulton St., Chicago, Ill.

RESIN—Tables of properties and application charts for various plastics produced from vinyl resins, as well as a brief description of the four major types of the latter, are contained in "Vinylite Resins, Their Forms, Properties, and Uses," a 20-page booklet released by Plastics Division, Carbide & Carbon Chemicals Corp., 30 East 42d St., New York, N. Y.

RESIN—Physical properties, chemistry, processing, together with numerous curves relative to effects by various plasticizers are contained in a 24-page publication, "Koroseal Handbook of Technical Information" —Section 1, available from the B. F. Goodrich Co., Akron, Ohio.

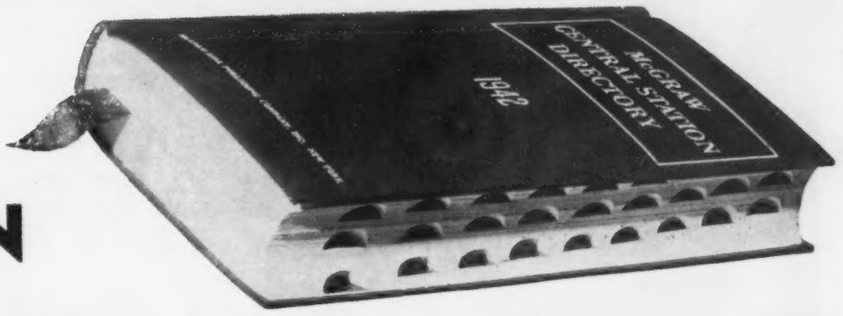
V-BELTS—"Plain Facts on Wartime Care of Rubber V-Belts," a handbook containing an outline—injury, cause and prevention—as well as information on tension, alignment of shafts, condition of sheave grooves and other items on maintenance of V-belts. Copy of the book may be obtained from Allis-Chalmers Mfg. Co., Milwaukee, Wis.

SWITCHGEAR STANDARDS—New standards (revision of 1937 edition) cover switchboards, assembled structures and accessories, also definitions, graphical symbols and information pertaining to standard equipment. "Power Switchgear Assemblies Standards," publication No. 42-72, may be obtained from National Electrical Manufacturers Association, 155 East 44th St., New York, N. Y.; price $3.25 per copy in U.S.A.

ELECTRONIC TUBES — A quick-selection and comprehensive chart of electronic tubes for industry, with technical data on tubes and applications, is available from the Radio, Television and Electronics Dept., General Electric Co., Schenectady, N. Y.

LIGHTING—For the various areas in shipbuilding plants, lighting calculations and recommendations for minimum maintained illumination for productive seeing are provided in a 12-page folder "Lighting for Ship Yards," obtainable from Holophane Company, Inc., 342 Madison Ave., New York, N. Y.

NEW 1942 EDITION



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Here's the book that gives you the latest changes in the utility field . . . it saves you time, travel and needless expense . . . assures correct contacts for priority orders

CONTENTS OF THIS HANDY, STURDILY-BOUND VOLUME

Names and addresses of independently owned and municipally operated electric light and power companies in the United States, Canada and U. S. Possessions; also, government controlled projects, State Commissions, and National and State Associations.

Names and addresses of affiliated, holding, controlling or managing and service companies with complete lists of properties controlled or managed by each, and including names and addresses of principal officials.

Names and addresses of officials and chief operating men for all operating companies.

For each operating company, the following information is presented:

Company total and Plant individual generating Capacity in kva. or kw.

Kind of Prime Mover and Capacity in hp.

Amount of power purchased in kw. hrs.

Type of current distributed, No. of wires, phase, voltage and cycle.

Circuit Miles Underground—duct distribution.

No. of meters served.

Location of power plants.

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Complete list of towns (of 500 Population or over) served.

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If the electric utility market is part of your picture, you can't afford to be without this new 1942 McGraw Central Station Directory. For there have been changes in the utility field during the past year—plenty!

Personnel has been changed . . . key men have been shifted . . . new power plants have been built to meet unprecedented load demands. The McGraw Central Station Directory supplies all the essential facts concerning these changes plus other complete, up-to-date information, in a form easy to use.

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To secure names and addresses of utility officials, determination of important utility operating data and scope of utilities' operation.

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Electrical Utilities:

To know organizational structure of other utilities, to keep posted on movements of utility officials and to size up discernible trends in expansion of operations.

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NEWS ABOUT PEOPLE

D. H. Mitchell New Head of Indiana Association

Dean H. Mitchell, who was elected president of the Indiana Electric Association at the recent convention in Indianapolis, has been president of the Northern Indiana Public Service Co. since 1938. Mr. Mitchell has worked his way up from the ranks in Indiana and has familiarized himself with all

phases of utility operation, from the financial field to the field of operations.

In 1924 he became assistant auditor of the Calumet Gas & Electric Co., one of the properties absorbed in the utility system which he now heads. He was made vice-president and general manager in 1934 and four years later was elected by the board of directors to succeed in the presidency John N. Shannahan, who had just died. The following year Mr. Mitchell was also elected president of the Indiana Hydro-Electric Power Co., a position formerly held by Mr. Shannahan.

In addition to being active in the Indiana Electric Association, Mr. Mitchell has devoted considerable time to the American Gas Association and the Indiana Gas Association, having served as president of the state group.

▶ W. F. WHITNEY, Wisconsin Public Service Commission, has been appointed to the executive committee of the National Association of Railroad and Utilities Commissioners.

▶ JACK MURRAH, lighting engineer for the Georgia Power Co. at Brunswick, has been transferred to the Atlanta division of the company, succeeding HOWARD L. MCKINLEY, who resigned to become an instructor in electronics at Georgia School of Technology.

▶ ROBERT E. OSTERHOLM, manager of the industrial department of the Ohio Power Co. in the northern Ohio division at Tiffin, has been appointed industrial manager of the Canton district.

▶ FRANK L. PIERCE has been appointed chief engineer of the Eureka Vacuum Cleaner Co. Mr. Pierce has assumed charge of all the company's engineering, including that on war products, to which Eureka is devoting all of its facilities at present. Mr. Pierce was formerly connected with the American Machine & Foundry Co. of New York as director of research. Early in his career he was identified with General Motors and from 1930 to 1939 with the Hoover Co., North Canton, Ohio, as research and designing engineer and chief product engineer.

▶ MONTE C. STREET has been appointed chief engineer at the power plant of the Key West Electric Co. at Key West, Fla., to fill the position recently made vacant by the retirement of ANTHONY YATES. Mr. Street was transferred to Key West last July from the Gulf States Utilities Co. of Beaumont, Tex., where he had been engaged in power plant operation and maintenance work for the past eighteen years. Both properties are subsidiaries of Engineers Public Service Co. Mr. Yates has been in the employ of the Key West Electric Co. for the past 43 years, starting the year following the organization of the company. He has served as chief engineer of the power plant for the past 23 years.

Westinghouse Officials Made Vice-Presidents

H. V. Putman, who was elected a vice-president of the Westinghouse Electric & Manufacturing Co. at a recent meeting of the directors (ELECTRICAL WORLD, October 10, page 18), has been manager of the company's transformer division since 1940. His first

H. V. Putman

H. F. Boe

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... for installations underground *with* concrete encasement — for main electrical service and other wire installations where duct banks are required for protection of cables.

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... heavier wall thickness for installations underground *without* concrete encasement.

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... underfloor wiring for industrial plants, office buildings, etc. providing permanent and easy access to power, light, and signal wires.

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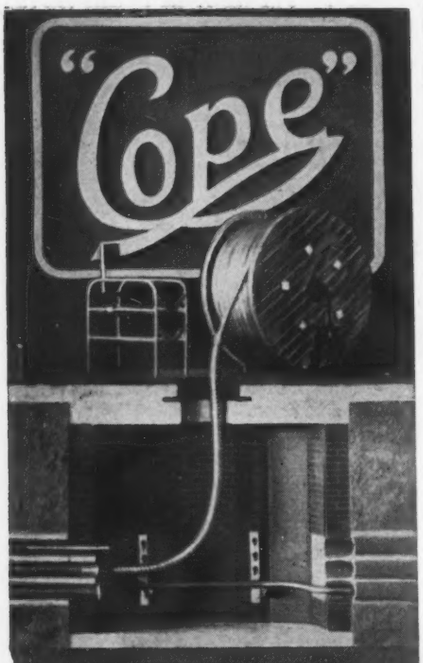

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work for Westinghouse was as a design engineer on synchronous motors, at the East Pittsburgh works. In 1930 he was transferred to Sharon as assistant manager of the transformer division's engineering department and two years later he was promoted to manager of engineering. In 1939 Mr. Putman received the Westinghouse Order of Merit for distinguished service.

As manager of the Westinghouse district repair and manufacturing department, Harry F. Boe, who was also elected a vice-president, supervises the operations of 35 plants located in strategic industrial centers from coast to coast. Mr. Boe began his career with Westinghouse in 1901 as a winder of motor armatures in the shops at the company's East Pittsburgh works. He spent seven years in testing electrical equipment and was then transferred to the general engineering department, later becoming a sales engineer in the general industrial division. Subsequent assignments followed in Rochester, Buffalo and New York. In 1937 he was transferred to Pittsburgh as commercial manager of Westinghouse, and the following year was appointed manager of the company's service department, later reorganized as the district manufacturing and repair department. Mr. Boe received the Westinghouse Order of Merit in 1941.

•

Watson Made President of De Laval Turbine Co.

H. L. Watson, since 1934 executive vice-president and director of the De Laval Steam Turbine Co., Trenton, N. J., has been elected to the presidency of that company, succeeding the late Francis J. Arend.

From 1913 to 1934 Mr. Watson was general sales manager. He was graduated from Rose Polytechnic Institute, Terre Haute, Ind., in 1905 and served as erecting engineer and later as sales engineer, specializing in steam turbine work with the Allis-Chalmers Manufacturing Co. until he entered the employ of the De Laval Co.

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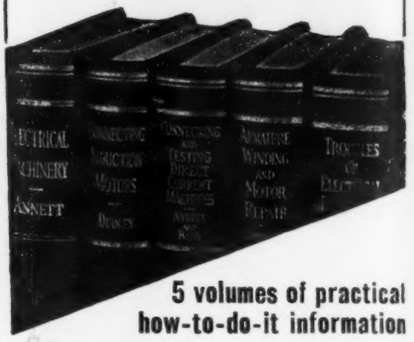
▶ Walter M. Dick, treasurer of the Westinghouse Electric Supply Co., has completed his fortieth year of service with the Westinghouse organization. Mr. Dick joined Westinghouse in 1901.

▶ James M. Stafford, Jr., assistant advertising manager of the Georgia Power Co., has been appointed state chairman of the payroll savings plan committee of the Georgia War Savings staff. With the appointment, Mr. Stafford became a dollar-a-year employee

Every phase of electrical maintenance and repair work covered in this Library



5 volumes of practical how-to-do-it information

Every man concerned with the care and repair of electrical machinery should have these practical books, with their helpful tables, diagrams, data, methods and kinks. Every one of the five volumes is jammed to the covers with sound, how-to-do-it information—the kind you have to have when anything goes wrong. Liberal use has been made of practical data and practice in repair shops so as to combine the good features of a library of methods with handbook information covering these methods.

Electrical Maintenance and Repair Library

2042 pages, 1721 illustrations and diagrams

These books show you how to

—install all types of motor and generator units;
—locate breaks in armature windings and do a workmanlike job of rewinding;
—know just what is wrong with an electrical machine and take charge of installation and maintenance work;
—make accurate tests of switchboards and apparatus and correctly balance the power with the load;
—handle every sort of wiring job;
—show competence, whether it be in the use of a Stillson wrench of a Wheatstone bridge.

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Now, in addition to four well-known practical books on all details of testing, connecting, rewinding, installing and maintaining electrical machinery, the Library includes Stafford's *Troubles of Electrical Equipment*, a handy book giving helpful maintenance information, special trouble-shooting charts, explanation of symptoms and causes of machinery troubles, specific remedies, etc. This revised library gives you the ability to handle bigger jobs with surety of results.

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of the United States Treasury Department and assumed his duties as such on September 25. He will devote fifteen days a month to this work.

▶F. E. PLUMMER has been appointed local manager at Greenville for the Mississippi Power & Light Co. Mr. Plummer has been associated with the company for 15 years and was until his recent promotion a member of the treasury department in the Jackson general offices.

▶WALTER W. R. MAY has relinquished his duties as OPA organizing officer for the state of Oregon with the completion of the initial organization of the state war price-ration boards. He has returned to his position as director of public relations with the Portland General Electric Co.

▶C. B. COLSTON, chairman of Hoover Limited, English affiliate of the Hoover Co., North Canton, Ohio, has been appointed to assist Minister of Production Lyttleton as the ministry of production regional controller for the London and Southeast region in all-out co-ordination of British war production. Mr. Colston has been associated with Hoover Limited from the beginning of Hoover activities in England back in 1919.

▶CLARENCE E. SHIPLET, superintendent of erection and machining at the Louisville division of the Westinghouse Electric & Manufacturing Co., has been awarded the Westinghouse order of merit for distinguished service. He received the award from F. D. Newbury, Westinghouse vice-president, who cited Mr. Shiplet "for his ability to organize relatively unskilled workers into a trained and enthusiastic team capable of assembling equipment of extreme accuracy of workmanship; for his technical ability and judgment in handling difficult factory problems, and for his devotion to the interests of the company."

▶JOHN LAWSON has been appointed manager of the customers' service department of the Spokane division of the Washington Water Power Co. Mr. Lawson succeeds J. E. WINTON, recently named assistant treasurer.

▶O. J. SCHAEFER, manager of the municipal sales department, West Penn Power Co., Pittsburgh, has retired from active service. Mr. Schaefer has given 32 years of service to West Penn, during the greater part of which time he was engaged in the promotion and sale of street lighting. Under his direction progressive street lighting plans were developed and installed in many western Pennsylvania communities. Local district managers will now be responsible for street lighting development and other municipal negotiations. The

An Important Message to

Technical Men

The war has carried the engineering age to a new peak! Production demands have created technical problems the like of which the world has never seen before! The services of engineers are at a premium. Especially the services of one particular class—executive engineers—*engineers with business training;* engineers who can "run the show."

In these critical times, the nation needs engineers of executive ability *now, today*—not five, or ten years from now! The shortage of such men is acute—even more acute than that of skilled production workers. And company heads, aware of this situation, are offering high rewards to engineers who have the necessary training in industrial management.

Golden Opportunity for Engineers

In this new era, the engineer with vision and foresight has a golden opportunity. He will realize that out of today's tremendous production battles will emerge technical men who not only will play a major role in winning the war, but who also will be firmly entrenched in key executive positions when peace comes.

However, before the engineer can take over executive responsibilities, he must acquire knowledge of the other divisions of business—of marketing, accounting and finance. He has of necessity a vast amount of technical training and experience. But in order to grasp the opportunities that present themselves today—to assume leadership on the production front—he must *also* have an understanding of practical business principles and methods.

The Alexander Hamilton Institute's intensive executive training can give you this essential business training to supplement your technical skill. It is a time-saving program that fits into the most crowded schedule. It is not intended for men who expect to remain just engineers for the rest of their lives. It is for those willing to train for the position that now seems just a little beyond them—the position which will increase their incomes today and make their security more certain when the war has ended.

134,000 men on the operating side of business have enrolled for this training. More than 37,500 are technical men—engineers, chemists, metallurgists—many of whom are today heads of our huge war industries.

This training appeals to engineers because it gives them access to the thinking and experience of the country's great business minds. It is especially valuable to such men because it is basic, not specialized—broad in scope, providing a thorough groundwork in the fundamentals underlying *all* business. It covers the principles that every top executive must understand. It applies to all types of industrial organizations, because all types of organizations are based on these same fundamentals.

Business and Industrial Leaders Contribute

The Institute's training plan has the endorsement of leading industrialists and business men. And it is only because these high-ranking executives recognize its value and give their cooperation that such a plan is possible. Among those who contribute to the Course are such men as Frederick W. Pickard, Vice President and Director, E. I. DuPont de Nemours & Co.; Thomas J. Watson, President, International Business Machines Corp.; James D. Mooney, President, General Motors Overseas Corp.; Clifton Slusser, Vice President, Goodyear Tire and Rubber Co. and Colby M. Chester, Chairman of the Board, General Foods Corp.

Send for "FORGING AHEAD IN BUSINESS"

The facts about the Institute's plan and what it can do for you are printed in the 64-page book, "Forging Ahead in Business". This book in its own right is well worth your reading. It might almost be called a handbook of business training. It is a book you will be glad to have in your library, and it will be sent to you without cost. Simply fill in and mail the attached coupon *today.*

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by using these perfect joint making units over and over again.

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co-ordination of this work will be under the general direction of Charles V. Doherty, who has long been associated with Mr. Schaefer.

▶ C. WALTER COAPMAN, treasurer of Victor Insulators, Inc., Victor, N. Y., has been appointed acting general manager of the company in the absence of Powell W. Price, vice-president and general manager, who has been granted a leave of absence for the duration. Mr. Price has been commissioned a lieutenant in the Navy.

▶ CHARLES F. SCOTT, professor of electrical engineering emeritus, Yale University, has been appointed a member of the sectional committee on definitions of electrical terms of the American Standards Association. Professor Scott is a past-president of the American Institute of Electrical Engineers and Edison medalist, 1929.

▶ DR. CHARLES E. LEBERKNIGHT has been appointed to head the newly created department of research of Kopp Glass, Inc., Swissvale, Pa. Dr. Leberknight was formerly identified with the research department of the Union Switch & Signal Co. in Pittsburgh. Recently the company withdrew from the manufacture of standard types of incandescent lighting glass ware and now is giving over its entire engineering, research and manufacturing facilities to production of technical and industrial glass specialties.

▶ WILLARD E. HENGES, who has been connected with the Graybar Electric Co. since 1913, has been appointed new district manager of the company at St. Louis. He replaces George Corrao, who has asked to be relieved of active duty subject to retirement next year. Mr. Henges began his career with Graybar as a warehouse clerk. Working his way up through various capacities, he became assistant manager in 1936, the position he held until his recent appointment. Active in association work, he is president of the St. Louis Electrical Board of Trade. He also served as president of the sales manager division of the St. Louis Chamber of Commerce during 1940.

▶ RALPH BRADFORD has been appointed general manager of the Chamber of Commerce of the United States. Mr. Bradford, secretary of the chamber since 1939, was named to the newly created office by the board of directors as a step in the general reorganization of the chamber's machinery of operation now under way. For a number of years before becoming secretary he was manager of the commercial organization department. Prior to that he was engaged in local chamber work in Texas, where he spent most of his life before going to Washington.

Brady Made Commercial Engineering Manager

Announcement has been made of the appointment of Ralph R. Brady as manager of the commercial engineering department, Westinghouse Electric & Manufacturing Co.'s lamp division in Bloomfield, N. J. Mr. Brady succeeds D. W. Atwater, recently appointed

manager of the new illuminating engineering department.

Mr. Brady brings to his new position more than 25 years of engineering experience. Following the first World War he became manager of the Electrical Testing Laboratories Bureau in Bloomfield. He joined the Westinghouse Lamp Division in 1929 as assistant test engineer and in 1934 was made head of all large lamp commercial activities, the position he held until his present appointment.

Among the technical societies in which Mr. Brady holds membership are the Illuminating Engineering Society, the American Society of Naval Engineers, National Aeronautic Association and the Association of American Railroads.

▶ J. A. CORLETT has been advanced by General Electric Co. to the position of Pacific District publicity representative with headquarters at San Francisco. In his new position he will collect, prepare and disseminate information on the application and performance of G. E. apparatus covering the states of California, Arizona and part of Nevada. Mr. Corlett was formerly located at Los Angeles.

▶ CEDRIC L. GUST, assistant chief electrical engineer of the Homestake Mining Co., Lead, S. D., since 1923, has been appointed chief electrical engineer to succeed J. F. WIGGERT, retired. Mr. Wiggert entered the employ of the company's electrical department in

1902. Through self-education he grew with the department, and in 1923 he was appointed chief electrical engineer. HAROLD E. ROSS has been named assistant chief electrical engineer.

▶W. E. SILVUS has been appointed to the position of engineer of the General Electric Co.'s Houston, Tex., local office. Mr. Silvus has been with the company's engineering department in the southwest district since 1926. He was graduated from Texas A. & M. with a B.S. in electrical engineering in 1922 and entered the G.E. "test" course in the following year.

OBITUARY

William H. Atkins

William H. Atkins, 83, who was general superintendent of the Boston Edison Co. for more than a third of a century, a vice-president in the latter portion of his service, and one of the pioneers of the New England electric utility field, died suddenly at his home in Medford Hillside, Mass., on October 7.

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▶WELCH H. JONES, engineer for the Kentucky Utilities Co., Lexington, died, of a heart attack, on October 3, in his fifty-ninth year. A native of Mercer County, Kentucky, Mr. Jones had been connected with the Kentucky Utilities Co. for forty years.

▶HAROLD S. JOHNSTON, chief engineer of the Nova Scotia Power Commission, died at Halifax, N. S., Canada, on October 6. He was 57 years of age. Mr. Johnston was formerly an engineer in electric power and railroad construction work in Alberta and Saskatchewan provinces. Removing to Halifax in 1920, he has served as chief engineer of the Nova Scotia Power Commission for about eleven years. Mr. Johnston was a graduate of McGill University, Montreal.

▶DABNEY PARRISH, assistant manager of the Mississippi Power & Light Co., Jackson, died suddenly on October 5 in that city. He was 79 years old. Mr. Parrish was born and reared in Raymond, Miss., leaving there to begin a career as a traveling salesman. After spending many years on the road he established residence in Jackson. He was identified with the telephone company in Jackson for 20 years and with the staff of the Deposit Guaranty Bank & Trust Co. before joining the Mississippi Power & Light Co. as a public relations man and assistant manager in 1930.

A single fire here

CAN KILL PRODUCTION IN A *Dozen* VITAL PLANTS

The Need of CARDOX Swift, Non-Damaging Extinguishment is MULTIPLIED in Power Plants

Fire in a plant producing war material is tragic. But fire in a generating station supplying power for a number of war plants is the height of industrial tragedy —Because of the multiple havoc wreaked on production schedules at points far removed from the actual fire scene.

Cardox Systems can be engineered to the individual requirements of the building, the special hazards or the budget for the best end result—*fire is instantly flooded with a mass discharge of low temperature carbon dioxide—of predetermined volume up to many tons per minute* discharged from storage temperature of 0° F. for maximum effectiveness. Flames are rapidly brought under control and extinguished, and materials in the fire zone are cooled below the re-ignition point—often in a matter of seconds.

Repair work is held to that caused by the short-lived fire itself. The extinguishing medium is harmless to valuable, hard-to-replace electrical generating equipment. Production in factories dependent on the power plant for energy is quickly resumed, without needless, costly delay.

Now, before fire strikes, get acquainted with Cardox. Write for Bulletin 5102.

How Cardox Built-In Systems Extinguish Fires

- *Timed discharges, as needed, through built-in piping systems... supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO_2.*
- *Mass discharge of Cardox CO_2 "knocks out" fire, by . . .*
- *Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .*
- *Cooling combustibles and fire zone below ignition temperature...*
- *Extinguishing fire quickly and completely, without damage from extinguishing medium.*

CARDOX—CO_2 Systems with Enhanced Fire Extinguishing Performance

A. *Uniformity of CO_2 characteristics.*

B. *Extinguishing medium with uniformly greater cooling effect.*

C. *Accurate projection of CO_2 through greater distances.*

D. *Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO_2.*

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NON-DAMAGING FIRE EXTINGUISHING SYSTEMS

MANUFACTURING-MARKETS

Distribution Cutouts Copper Conserved

Acting upon a request from WPB to save critical materials, the National Electrical Manufacturers Association has changed the NEMA standard for distribution cutouts to reduce the overall length of universal fuse links (0 to 15 kv.) for distribution cutouts from 23 to 20 in. (minimum). The change in the standard was approved September 9 and became effective immediately.

Links manufactured prior to that date to the former standard of 23 in. and which are now in stock will not be affected. Since practically all applications of these 23-in. links, as well as many of the new 20-in. ones, will permit cutting off surplus copper ends when they are installed in distribution cutouts in service, every effort should be made, according to NEMA, by users to accumulate these ends for salvage.

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Entire City Celebrates Tool Company's Award

In recognition of the conferring of the Army-Navy production award upon the Independent Pneumatic Tool Co., the city council of Aurora, Ill., proclaimed October 8 as the city's Army-Navy day. In salute to the manufacturers of Thor portable electric and pneumatic tools, whose production efforts won for them the "E" award, the entire community participated in a series of civic events which culminated in the formal presentation of the award banner and "E" emblems to the employees of the tool company. A colorful parade, with approximately 5,000 servicemen, workers and civic organizations in its ranks, proceeded from the City Hall to the plant for the ceremonies.

The program highlighted such activities as a city-wide scrap and salvage drive, Army and Navy recruiting, special religious ceremonies and the conducting of a fifteen-minute period when every merchant in the city sold only war bonds and stamps.

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G.E. Holders Increase

Stockholders of the General Electric Co. on September 25, the record date for the October 24 dividend, numbered 220,883, an increase of 2,731 in the year, according to W. W. Trench, secretary of the company.

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Salvages Tons of Scrap

Standard Oil Co. of Indiana has collected 7,500 tons of scrap metal in the first seven months of this year at refineries and sales department warehouses.

Less Rigid Research Censorship Sought

Less strict censorship of the results of scientific research was urged in the annual report issued recently by the welding research committee of the Engineering Foundation.

G. F. Jenks, president of the American Welding Society and chairman of the committee's industrial research division, said: "The division is beginning to feel the results of restrictions in the publication of information because of government censorship. It believes that the greatest benefits to war production and to victory in the field will result from a liberal policy through which the results of research will be disseminated immediately to American engineers and scientists."

The committee, headed by C. A. Adams of Philadelphia, reviewed the large number of studies on the various

"E" FLAG TO FRIGIDAIRE—Major-General Hayes presents "E" flag to Frigidaire—(Left to right) Major-General T. J. Hayes, chief of industrial division, Army Ordnance Department; E. G. Biechler, general manager, Frigidaire Division, General Motors, and Lem Markland, president of Local 801, United Electric Radio and Machine Workers Union, CIO

questions of welding, which it completed or carried on during the year ending October 1.

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Improvements Save Vital Materials

Saving of huge quantities of war-vital materials through recent improvements in the construction of electric transformers was reported at the recent Pittsburgh meeting of the Association of Iron and Steel Engineers by J. K. Hodnette, manager of engineering, Westinghouse Electric & Manufacturing Co., Sharon, Pa.

Three recent developments have enabled Westinghouse to save 4,000 tons of steel, 1,000 tons of copper and large amounts of oil since Pearl Harbor. Transformers are being constructed with one-third less material because of engineering advances, including a new magnetic steel, called Hipersil, for transformer cores; a device to make each unit carry its maximum electrical load safely, and improved methods of cooling the oil in transformer tanks.

In addition to saving materials, these engineering advances have resulted in better transformers. Shipping and handling have been made easier. Many of the larger units that formerly had to be shipped in parts and assembled in the field can now be made small enough to be assembled in the factory and shipped complete on a single flat car.

Development of a small heat relay, five inches square, has made it possible to increase the transformer load. Until this device was developed transformers had to be designed considerably larger than actually necessary to provide a factor of safety which would insure against damage.

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Three More Plants Get Army-Navy "E" Award

The Dallas division of Revere Copper and Brass Incorporated located in Chicago has been awarded the Army-Navy "E" for high achievement in the production of war equipment. At the special ceremonies Rear Admiral H. A. Wiley, U.S.N. (Retired) presented an award to C. Donald Dallas, president of Revere Copper and Brass, for the third time, the two previous occasions being in April this year when the company's New Bedford division received the Navy "E" award and in May when the Rome division was complimented.

The "E" award has been given recently to the Aurora, Ill., plant of the Independent Pneumatic Tool Co. and to the Homelite Corp., at Greenwich, Conn.

The Victory Flow of Vital POWER•

In the titanic struggle for production supremacy Uptegraff Transformers are rendering important service to industry and the nation.

Their instant adaptability and dependable performance under all operating conditions have eliminated costly delays and speeded production in hundreds of plants and emergency operations throughout America.

UPTEGRAFF POWER TRANSFORMERS

R. E. UPTEGRAFF Manufacturing Co., SCOTTDALE, PA.

A NEW TOOL FOR PRODUCTION

The G-E "MASTER NO BLINK" Fluorescent Starter

A radically new G-E fluorescent starter—the "Master No Blink"—eliminates flickering of dead lamps and helps to increase war production in three new important ways:

IT SAVES TIME by allowing *instant* dead lamp replacements. That means less maintenance time wasted in war factories.

IT SAVES POWER by eliminating *all* flow of current from the ballast under dead lamp conditions. Other starters require current to keep the lamp from flickering, thereby wasting power.

IT SAVES MATERIALS by reducing the number of replacement starters. The G-E "Master No Blink" will last longer than any other starter.

Ask us today for full particulars—how it operates and how it saves you money. Just write to Section G1021-9, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

Field Reports on Business

Contracts for heavy equipment tapered off last week, but a large volume of orders for diversified equipment was booked. The large expansion program of steel-producing facilities has included substantial orders for electric furnaces. As war orders increase, the demand for factory workers is rising steadily.

NEW YORK

Stoppage of appliance manufacture and the gradual contraction of inventories is resulting in an increasing number of dealers going out of business, recent check-ups reveal. Service business is providing a source of revenue for some of the outlets, while others have experimented with varying types of allied merchandise to keep the cash register clicking. But it is estimated that the mortality among appliance dealers will reach 50 percent or more by the end of 1943. Appliance dealers thinking of going into the furniture field would find little encouragement in that allied realm of consumers' goods. The executive director of the New York Furniture Merchants Association predicted last week that at least one-third of the smaller furniture dealers would be out of business in a few months. Sales are running 40 to 50 percent under last year.

Retail trade generally, however, remains brisk. Department store sales for the week ended October 3 were up 2 percent over the corresponding 1941 week and were also up 2 percent for the four-week period, according to the Federal Reserve Board.

Engineering construction volume for the latest week totaled $139,855,000, an increase of 78 percent over the corresponding week last year, according to the *Engineering News-Record*. The latest week's figure is 31 percent below the previous week reported, however. The current week's construction brings 1942 volume to $7,975,782,000, an increase of 58 percent over the 41-week period last year.

NEW ENGLAND

A large volume of orders for small lots of diversified equipment was booked last week. Negotiated contracts for heavy equipment and machinery slackened off, but urgent calls have been sent out for more than 2,000 resistors rated up to 50,000 ohms, radio supplies, and communication apparatus. Bids have been put in for large numbers of push-button sockets, porcelain cleats and tubes; wire and electric cable continue among the leaders in government demands due to changes and increases in army and navy facilities. Electric cable and rubber-jacketed wire in 500-ft. coils are in demand; wiring supplies for temporary frame buildings being constructed by the Army Engineer Corps are active, and lighting fixtures are moving at a good rate.

Electric furnace manufacturers are keeping up to delivery schedules despite a rigid tightening up of essential materials; bids have been filed for two controlled atmospheric electric furnaces; replacement of obsolete furnaces with high-speed types is being planned, and accessories now in strong demand will carry manufacturers over the year with full employment quotas. Welding units are selling at a good rate, but scarcity of rod is growing more serious and may hamper stepping up production in some shipyards.

Machine tool builders are placing orders for small motors at regular intervals. One group of 18 motor bench grinders was booked last week; small motors from ½ hp. up are still available on high priority within five weeks delivery. Factory power changes in the greater Boston area, requiring wiring supplies for transformer installations and motor hook-ups, show no signs of abating.

A new study of ship plans and specifications is in the offing, according to some opinions, carrying with it possibilities of further strides in heavy electrical machinery buying.

CHICAGO

Industrial production continues to advance to new high levels although handicapped by a shortage and erratic flow of materials and by unbalanced production schedules. Although employment is slightly below the peak of September, 1941, wages have soared to an all-time high level. The demand for factory workers is climbing steadily, however, as war orders increase and new plants are continually joining the production line.

Rapid strides are being made toward completing the large expansion program of steel producing facilities in this area, before the July, 1943, deadline. Included in the projects now well under way are 341 new coke ovens, nine blast furnaces with nearly 2,500,000 tons capacity, six open hearth furnaces and six electric furnaces. The entire program involves extensive use of electrical apparatus.

Industrial plant expansion continues to be the source of large orders for a wide variety of electrical equipment. Of 26 manufacturers reporting September sales to the Electric Association thirteen had increases over the previous month, while eleven showed gains over September, 1941. For the nine months seventeen showed gains over the previous year. Among the electrical wholesalers 50 percent reported increases and the other half incurred losses, both in comparison with the previous month and for the nine-month period.

Department store sales in Chicago last week decreased 8 percent from a year ago, the largest decline of any city in the district which showed a 3 percent loss.

PACIFIC COAST

Temporarily, at least, Army construction contracts in the western states are mainly of the kind officially classified as "under $500,000" and their electrical sub-contracts as "under $50,000." However, despite rumors as to the cessation of new large work, some contracts in substantial amounts are being placed. There is also a definite trend eastward, in the new installations. All these jobs require much electrical material. Much new housing construction is foreshadowed by the appropriation of $1,500,000,000 just made by Washington.

It is predicted that wholesalers' annual inventories will not be unreasonably greater than a year ago, due to rapid turnover, allowable substitutions to give quick delivery, and necessary concentration upon available items.

Varied orders of interest include $64,000 pipe and fittings for tube valve controls at Shasta Dam; $10,144 of G.E. circuit breaker parts and a group of 250-kva. transformers for Los Angeles; a 450-kv. and a 300-kv. substation, costing $25,000, for an air base; 3,000,000 lb. of welding rods, costing $190,000, for an East Bay shipyard.

Commends Utilities for Fuel Conservation

Fuel savings by power companies resulting from careful engineering design and plant operation were cited as a valuable contribution to the war effort in an address on September 23 before the Boston Society of Civil Engineers and the Boston Section of the American Society of Military Engineers by Lieut.-Col. J. W. H. Myrick, director of the smoke prevention division of the Massachusetts Department of Public Utilities.

Big Saving Foreseen

A life-long specialist in heating and ventilation practice, Colonel Myrick declared with proper combustion conditions, 10,000 carloads of fuel can be saved annually in the Metropolitan Boston area in residential and commercial heating installations. He maintained that widespread ignorance of how to deal with combustion problems continues responsible for inexcusable wastes of fuel, and asserted that one of the major reasons for the success of power utilities is their ability to generate electrical energy on the basis of large-scale economy. So closely do utility engineers investigate fuel problems, the speaker said, that a difference of one-eighth of a cent per kilowatt-hour in the estimated obtainable operating economy of Boston Edison's Edgar station swung the decision of the management in favor of its construction.

Industrial Smoke Screen

In a brief discussion of the speaker's recommended scheme for a smoke screen production as a defense measure to blanket out the Boston area in the event of air raids, it was brought out that household and commercial furnaces offer considerable aid if properly handled. In utility engineering circles, however, it is believed that heavy sustained smoke production in the operation of modern central station boilers would create serious fire and explosion hazards. One speaker stated that if such heavy smoke production were maintained, say for eight hours, soot deposits in the cooler surfaces of flues and air heaters might establish a fire risk, and that the accumulation of unburned volatile matter in pockets would tend toward explosive conditions. Streams of black smoke proceeding from station stacks, especially where multiple chimneys are used, might form long directive arrows under certain wind conditions to guide enemy bombers toward their targets. Smokeless operation of large utility stations was to be preferred, according to operating opinions.

NATIONAL POWER SHOW

geared for war, this year at

MADISON SQUARE GARDEN

The U. S. Army has taken over the exposition floors of Grand Central Palace, familiar home of the National Exposition of Power and Mechanical Engineering. The Exposition therefore will be staged this year in the Exposition Hall of New York's famous Madison Square Garden.

With ample space for all exhibits, every convenience for visitors, central location and adequate facilities for operating demonstrations, the Exposition will be a potent factor in helping to win the war.

NEVER BEFORE HAS THE POWER SHOW BEEN OF SUCH VITAL IMPORTANCE

War has brought its own special problems to industry . . . and engineers are carrying their full share of responsibility for finding the answers. The engineering press is helping mightily, but no matter how careful your reading may be, there's no substitute for first-hand observation, demonstration and down-to-earth conversation, face-to-face with qualified experts in specialized fields!

Your visit to the 1942 Power Show will bring you benefits limited only by the time you spend there. You can personally learn about available products and newest methods. You can discuss these with technical representatives of America's most progressive manufacturers. They are devoting their time to helping you solve the problems created by war.

This year, of all years, be sure to come—and bring your associates.

See how . . . hear how . . . learn how . . . at the

15th NATIONAL POWER SHOW

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

Nov. 30—Dec. 4, 1942, Madison Square Garden, N.Y.

Managed by International Exposition Co.

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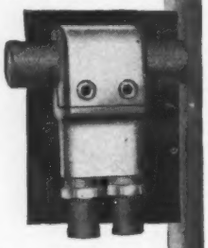

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WASHINGTON—Puget Sound Power & Light Co., Seattle, plans new indoor-type power substation, about 25x60 ft., to be known as Greenlake substation. Extensions will be made in transmission line in that district. Work is scheduled to begin soon.

NEBRASKA—War Department, Washington, D. C., has authorized new air force base, comprising group of one and multi-story buildings, with hangars, shops, warehouses and other industrial structures. A power substation is planned, with electrical distribution system for airfield, industrial and residential service. Complete project will cost over $2,000,000, and will be supervised by U. S. District Engineer Office, Omaha.

LOUISIANA—Firestone Tire & Rubber Co., Akron, Ohio, plans two large synthetic rubber mills for production for government, each consisting of several one and multi-story processing and production buildings. Complete electrical equipment and facilities will be installed. A power substation is planned at each mill. Entire project is reported to cost over $4,000,000, with financing by Defense Plant Corp. Buildings will be designed and erected by H. K. Ferguson Co., Hanna Building, Cleveland, Ohio, engineer and contractor. Proposed to begin work soon.

NEW MEXICO—U. S. District Engineer Office, Albuquerque, will take bids at once for an electrical distribution system to furnish power for a group of 80 buildings at a military base in De Baca County; also for new pumping station, with three high-service motor-driven pumping units and accessories (Advance Notice No. 186).

MISSISSIPPI—Civil Aeronautics Authority, Washington, D. C., has approved plans for new major airport in Adams County, including large hangar, shop and auxiliary structures. A complete lighting system will be installed. Fund of $593,325 has been allocated for project, work to be placed under way soon.

ILLINOIS—Commonwealth Edison Co., Chicago, will make extensions and improvements in power substation at 1510 West Division Street, with equipment and facilities for increased capacity.

NEBRASKA—City Council, Nebraska City, plans purchase of local steam-electric power plant and distribution system of Consumers Public Power District, and will develop for municipal operation in future. Citizens will vote on proposition at general election, November 3, including issuance of bonds for $1,475,000 for project.

NEW YORK—War Department, Washington, D. C., has authorized construction of new military cantonment in Rockland County, comprising large group of one and multi-story buildings, including shops, warehouses and other industrial structures. Complete electrical equipment and facilities will be installed. A boiler house is planned for central-heating service. Entire project will cost over $5,000,000. Tuttle, Seelye, Place & Raymond, 101 Park Avenue, New York, are architects and engineers. U. S. District Engineer Office, New York, will supervise project.

PENNSYLVANIA—Koppers Co., Inc., Koppers Building, Pittsburgh, operating iron and steel, coke, chemical and other industries, has arranged with government for construction and operation of new plant in an East Central State for production of butadiene and styrene. Plant will consist of a group of 35 one and multi-story buildings, including main processing and production units, storage and distributing structures, administration buildings and miscellaneous structures. Complete electrical equipment and facilities will be installed. Project is reported to cost over $5,000,000. Buildings will be designed and constructed by Rust Engineering Co., Clark Building, Pittsburgh, engineer and contractor.

CALIFORNIA—Bureau of Reclamation, Denver, Colo., receives bids until October 30 for furnishing and delivering four 30-in. sphere valves, complete with controls and accessories for station-service penstocks at Shasta power plant, Kennett Division, Central Valley project, Calif. Equipment will be installed by government (Specifications 1049).

WEST VIRGINIA—U. S. Engineer Office, Huntington, has plans under way for hydraulic turbines and electric generating units for installation at Bluestone hydroelectric power project, including auxiliary equipment. Work is scheduled to be carried out at early date.

NEBRASKA—War Department, Washington, D. C., has authorized new air force base including a large group of buildings, with hangars, shops, warehouses and other industrial structures. A power substation is planned, with electrical distribution system for airfield, industrial and residential service. Entire project will cost close to $2,000,000 and will be supervised by U. S. District Engineer Office, Davidson Building, Kansas City(Mo.

IOWA—Iowa Electric Co., Cedar Rapids, plans extensions in transmission lines to Hills (Johnson County), where service will be furnished in future. A power substation will be installed, with local electrical distribution system. Franchise has been granted and work will be carried out soon.

KANSAS—Midwest Solvents Corp., recently organized, care of Smith, Hinchman & Grylls, Inc., Marquette Building, Detroit, Mich., architect and engineer, plans new plant in Atchison County for production of certain war chemicals for government. It will comprise several large one and multi-story buildings for processing and production, with number of smaller units for storage, distribution and other operating service. Complete electrical equipment and facilities will be installed. Entire project will cost over $2,500,000, with financing by Defense Plant Corp. Architect and engineer noted in charge. Construction will begin at early date.

SOUTH CAROLINA—Civil Aeronautics Authority, Washington, D. C., has authorized new airport in Darlington County, using a tract of about 3,000 acres of land. Project will include hangars, shops and other buildings. A complete lighting system will be installed. Fund of $750,000 has been authorized for project.

MINNESOTA—Minneapolis Street Railway Co., Minneapolis, plans early installation of equipment in new addition to feeder substation on East Lake Street, about 27x43 ft., indoor-type, now in course of construction. Completion is scheduled late in November.

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Lincoln Grand Award Goes to Navy Men

Capt. C. A. Trexel and A. Amirikian, director of planning and design and design engineer, respectively, Bureau of Yards and Docks, Navy Department, Washington, D. C., have been announced recipients of the $13,700 grand award in the nationwide 2½-year $200,000 welding study program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

"Savings in critical materials and in production costs," said Dr. E. E. Dreese, chairman of the Lincoln Foundation, and of its jury of award, "reported available by arc welding in the award studies, assume such proportions as to be of vital national significance. The figures, based on representative products and structures, show a possible annual cost savings of $1,825,000,000. This includes 7,000,000 tons of steel valued at $271,000,000 and 153,000,000 man hours of labor . . . "

Winner of the second grand award, $11,200, was John L. Miller, Firestone Tire & Rubber Co., Akron, and the third grand award, $8,700, went to H. Thomasson, Canadian Westinghouse Co., Ltd., Hamilton, Ont.

There was a total of 408 awards going to 458 participants.

•

Ross Dam Bids Canceled

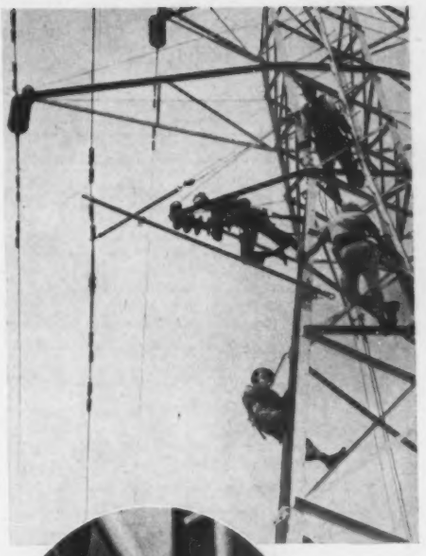
The Seattle Board of Public Works has rejected the combined bid of General Construction Co., Morris Knudsen Co. and J. F. Shea of $6,146,214 for construction of the second step of Ross Dam. The board took action on the recommendation of Superintendent of Light E. R. Hoffman because it could no longer legally withhold the bids submitted on August 6, after a five-week period.

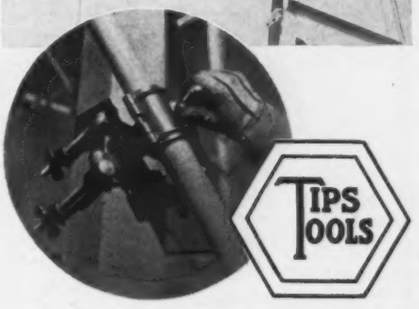
Lack of decision on the part of federal authorities, through WPB, to agree to provide an additional $2,230,000 needed to carry out the project was the reason for the decision, Hoffman explained. Sharp increases in the cost of performing the work since the $8,300,000 estimate was made several months ago resulted in the low bids totaling $10,530,000, or $2,230,000 above the funds available.

•

Coal Stocks High

Electric utility power plants consumed 5,937,237 tons of coal in August, the Federal Power Commission has reported. Coal stocks of electric utility power plants as of September 1 were the highest in history, being 60.9 percent over the same date last year.





Tower Leg Clamps make "Hot Sticks" more versatile . . .

By simply adding this tower leg clamp, an insulated link stick, and cotter key tools to present equipment Tips Wire Tong sets can be used on towers to clear the way for repairing or replacing suspension insulators without interrupting service.

This method as illustrated above eliminates the need for special suspension equipment, and in many cases the job can be handled much quicker than by the suspension link stick method.

This tower leg clamp permits the wire tong to turn at almost any angle to contact the conductor. The link stick suspended from above by rope blocks, provides insulation protection and carries a big part of the load. The other equipment required consists of small cotter key tools which attach to an insulated universal pole.

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LETTER TO THE EDITOR

Gasoline Allowance for Service Men

To the Editor of ELECTRICAL WORLD:

Being a regular reader of ELECTRICAL WORLD, I noticed your article on page 75 of the September 5 issue concerning a gasoline allowance for service men engaged in installation, adjustment, repair or overhauling of non-portable household appliances. I am sorry to note that this article contains certain misinformation which may cause a great many readers very serious disappointment, to say the least.

The holder of "B" or "C" coupons is not entitled to use any of these coupons for pleasure driving. However, the holder of a "B" or "C" book also has an "A" book which contains coupons for a total of 240 miles per month, figured on the basis of 15 miles to the gallon. Of this mileage, the first 150 miles is dedicated to any necessary occupational driving which the holder may require, and there is only 90 miles per month which the holder is free to use for so-called pleasure driving. In case the holder has no occupational use for the car, it is true that he may use the whole 240 miles for any purpose he chooses so far as the law is concerned, but it is not considered very patriotic, however, to use more than 90 miles per month for other than occupational purposes.

Coupons for a total of 470 miles per month is the maximum amount which may be issued to any one for occupational purposes, except those who may be qualified for preferred mileage under Section 1394.506(1) of the Gasoline Rationing Regulations, Order No. 5A.

The Gasoline Rationing Law is an extremely serious matter for hundreds of thousands of people, and particularly for a very great number of people who are being practically put out of business because they cannot qualify for preferred mileage, but are being limited to 470 miles monthly for business use, and it seems to me it is too serious and important a matter to many of your readers for you to publish statements on the subject without being properly advised as to their correctness.

S. W. BORDEN, Chairman,
Gasoline Rationing Panel,
War Price and Rationing
Board No. 7, Summit, N. J.

[NOTE—If retail servicemen use their car for "occupational driving"—this means any use of the car in their business—150 miles of the "A" card ration must be used for occupational driving, and they are entitled to additional rations permitting up to 470 miles of occupational driving. In addition to this servicemen who are eligible for preferred mileage under Section 506(1) are entitled to additional mileage over the 470, and all of this must be used for business eligible to preferred mileage—installation, adjustment, repair or hauling of non-portable household appliances. A serviceman, therefore, can make trips to repair, for instance, a radio and trips to repair a refrigerator. The radio trip would be charged against the 470 miles of occupational driving; the refrigerator trip would be entitled to preferred mileage gasoline. The same car may be used for both types of operations, so long as the serviceman is able to show his local board the kind of trips he is making and justify a need for preferred mileage in addition to normal occupational driving.

The real purport of the paragraph was to show that servicemen are entitled to preferred mileage, and on this score the paragraph is correct, although the use of the words "pleasure driving" instead of "occupational driving" was incorrect.—EDITOR.]

•

REA Allotments Total $120,000

The Rural Electrification Administration recently announced allotments totalling $120,000 to five systems.

An allotment of $15,000 to an Iowa cooperative will be used to rehabilitate storm-damaged feeder lines from the generating source. Three others cover reimbursement of member connection funds and unanticipated construction costs, while a loan to an Ohio cooperative for the purchase of used substation equipment will enable it to release two mobile generating units for prospective war loads.

Details are as follows:

IOWA—Pocahontas County Rural Electric Cooperative, Pocahontas, G. M. Stockdale, supt., $15,000 to rehabilitate storm-damaged feeder lines.

MICHIGAN—Southeastern Michigan Rural Electric Cooperative, Inc., Adrian, Ramior Evans, mgr., $30,000 to reimburse general and member connection funds.

MINNESOTA—McLeod Cooperative Power Assn., Glencoe, $20,000 to reimburse member extension fund.

OHIO—Washington Electric Cooperative, Inc., Marietta, George White, mgr., $15,000 for purchase of used substation equipment to permit release of two mobile generating units for prospective war loads and for reimbursement to member connection fund.

TENNESSEE—Caney Fork Electric Cooperative, Inc., McMinnville, $40,000 to cover increased construction costs and to reimburse member connection fund.

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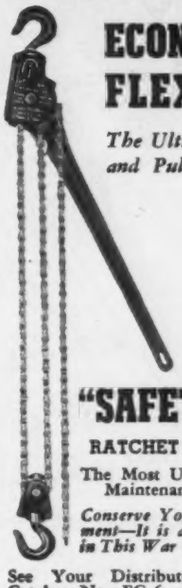

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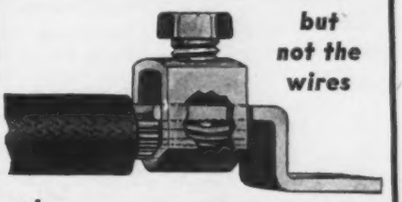

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Looking for More Hydros in Future

"It seems worth while to prepare ourselves for further hydro-electric developments as soon as the war situation clears up and governmental restrictions are removed," said President Walter S. Wyman of the Central Maine Power Co. in a message to stockholders October 1. Mr. Wyman's comment arose from the anxiety now being expressed by government officials and others over the national fuel situation, bearing in mind that the amount of coal and oil which remain in the ground represent a limited resource, unreplaceable when once exhausted. Central Maine Power owns a substantial amount of undeveloped water power, and in Mr. Wyman's opinion it is important to take a long view into the future in relation to postwar undertakings of this character.

The company's 1942 operations have been carried on thus far with ability to supply shipbuilding plants and other war activities with all required service and still having ample power to serve all customers. Some civilian customers, however, have been forced out of business by the war and others have had to curtail their activities. This has taken place mainly among smaller customers and has brought about the loss of relatively high-priced business to the company. Merchandising has fallen off because of the difficulty of getting appliances to sell, but all employees in this work who have not gone into war production or into the armed services have been assigned to replace employees in other departments who have left for these reasons.

Water Conditions Better

Water conditions on the Kennebec and Androscoggin rivers remain much better this year than last. The Kennebec storage has more than four times as much water in it than a year ago, and conditions on the Androscoggin are similar. The new Mason steam plant at Wiscasset has been in almost continuous operation this year and has been equipped to burn coal, following the original design to utilize fuel oil. The company is now erecting the necessary unloading apparatus so that coal can be discharged from barges or steamers. Using water-borne coal instead of the present rail shipments will save nearly $2 per ton in costs.

During the year ended August 31, 1942, the combined electrical output of Central Maine system and the affiliated Cumberland County Power & Light (Portland) utility totaled about 957,000,000 kw.-hr., of which about 280,000,000 was produced from steam. As these two companies are now operated as a physical unit and are in process of be-

ing merged into one corporation, Central Maine would have had a market for 280,000,000 kw.-hr. of hydro in the past twelve months had this additional amount been available. Additional demands for hydro, either in plants or storage, or both, can be envisioned in the future. Gross revenue for the eight months ended August 31 increased $511,633 over the same period of 1941, but expenses rose $697,383, making operating net $185,730 less. These increased costs were largely due to $175,210 in higher steam operation expense, $297,391 in tax rise and $151,641 increase in depreciation reserve. The balance for the twelve months ended Aug. 31 was $518,510 after preferred dividend requirements of $1,347,181.

•

Limit Scope of Army-Navy Award

The joint Army and Navy award committee voted formally recently to limit the award of the Army-Navy "E" to manufacturing concerns making war equipment and to producers of raw materials. The action closes the door to award of the citation to service industries such as utilities.

The issue arose as a result of the nomination of an electric and gas utility for the award. The nomination was rejected, not on the question of whether the utility merited citation but on the policy ground that the scope of the award should be limited.

The possibility was discussed by the committee of creating a separate award for achievements by industry outside this scope, but it was agreed that if any such citation is to be created it should be by another agency than the military services, perhaps the War Production Board.

•

Denver Installing 300 Luminaires

The city of Denver is in process of installing 300 new mercury-vapor street luminaires as a safety measure to reduce traffic hazards in the community, whose population has increased between 75,000 and 100,000 due to war industries.

All equipment was ordered prior to Dec. 7, 1941, and was part of a program to make Denver "the best lighted city in the world, and the safest." It is being mounted in compliance with WPB regulations, at a saving in critical war materials and at an actual reduction in connected load. Dana W. Rowten, Public Service Co. of Colorado illuminating engineer, is supervising the installation.

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Send me Crouse's Automotive Electrical Equipment for 10 days examination on approval. In 10 days I will send $2.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders. Same return privilege.)

Name .....
Address .....
City & State .....
Position .....
Company .....W. 10-17-42

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00.
(See ¶ on Box Numbers.)
POSITIONS WANTED (full or part-time salaried employment only), ½ above rates.
PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is $7.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.W.

NEW ADVERTISEMENTS received by 10 A. M. October 26th will appear in the October 31st issue subject to limitations of space available.

WANTED

Chief Electrical Engineer

Experienced in design and development of drum type control equipment as applied to heavy material handling machinery. Excellent salary with well established mid-west firm. Please give all details in first reply.

P-59, Electrical World
520 No. Michigan Ave., Chicago, Ill.

EMPLOYMENT SERVICE

SALARIED POSITIONS — $2,500 to $25,000. This advertising service of 32 years' recognized standing negotiates for positions of calibre indicated. Procedure individualized to your personal requirements. Retaining fee protected by refund provision. Identity covered. If salary has been $2,500 or more send for details. R. W. Bixby, Inc., 262 Delward Bldg., Buffalo, N. Y.

EXECUTIVE AND TECHNICAL MEN, Qualified candidate desiring $2,500 to $20,000 position may contact employers through our confidential services, established 27 years. The National Business Bourse, 20 W. Jackson Blvd., Chicago.

POSITIONS WANTED

MANAGER—Utility manager with broad experience operation and management electric, gas, water, heating, ice; steam, hydro, oil engine; both independent and network properties. Good record public relations, personnel, business development, accounting, present problems. Can assume sole responsibility. Draft exempt. Will consider change. Negotiations confidential. Address Box PW 80, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

SAFETY DIRECTOR—Experienced same work with large utility. Most all branches utility construction, operation, management. Take charge, get results. Draft exempt. Consider changing. Address PW-81, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

ELECTRICAL ENGINEER or Chief Electrician for industrial plant. Technical Night School graduate. 26 years experience includes—factory testing; oil refinery and oil field design, installation, and maintenance of electrical distribution systems and equipment. PW-82, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

MAN—AGE 35—College graduate, 3A classification, 12 years experience in Public Utility work including Accounting, New Business, Power Sales and Public Relations work, desires permanent position in electric company with chance for advancement. Available November 1st. PW-84, Electrical World, 330 W. 42nd St., New York, N. Y.

SELLING OPPORTUNITIES
OFFERED—WANTED
Selling Agencies—Sales Executives
Salesmen—Additional Lines

OPPORTUNITY OFFERED

ASSISTANT SALES MANAGER for company selling nationally, capable of handling men and devising sales methods. Should be electrical engineering graduate. Exceptional opportunity, permanent position. State qualifications, past experience, salary desired. Replies confidential. SW-83, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

POSITION VACANT

Electrical engineer for magnetic and development work. Electrical engineers, metallurgical engineers or physicists may apply. Advanced degree desirable. Previous research or pilot plant experience helpful. Location Pittsburgh. Address

P-78, Electrical World
330 West 42nd St., New York City

BUSINESS FOR SALE

Prosperous going company doing rewinding, rebuilding & manufacturing of transformers wishes to sell all stock (management retiring due to illness); location of plant in Central State; investment less than $70,000 with terms to capable party; organization intact.

BO-73, Electrical World
520 No. Michigan Ave., Chicago, Ill.

OPPORTUNITIES!

in

New and used equipment recently released from service by a number of electric and gas utility companies.

POWER PLANT EQUIPMENT
CONSTRUCTION EQUIPMENT
SUBSTATION EQUIPMENT
TRANSMISSION LINE MATERIALS

Send for new list, . . . to

APPARATUS EXCHANGE
EBASCO SERVICES INCORPORATED
Two Rector St. New York, N. Y.

Used Generators For Sale

Former Pierce Arrow Motor Car Corp. equipment

Crocker-Wheeler 350 KW D.C. Generator connected to 560-600 H.P. Heavy Duty **Skinner** Engine size 24" x 24".

Westinghouse 200 KW A.C. Generator 25 Cycle, 3 Phase connected to 330 H.P. **Skinner** Heavy Duty size 19" x 20". Engine—with **Westinghouse** Excitor.

Westinghouse 200 KW A.C. Generator, 25 Cycle 3 Phase, connected to 300-400 H.P. **Skinner** Heavy Duty Engine size 19" x 20" with **Westinghouse** Excitor.

Detail information and prices on request

1695 ELMWOOD AVENUE CORP.
Purchaser of Assets of:
Pierce Arrow Motor Car Corp.
1695 Elmwood Ave. Buffalo, N. Y.

MACHINERY FOR SALE

4—100 KVA, G. E. Transformers, V. 33000-2300, 60 cyc.
3—150 KVA, West., V. 2300-115-230-460.
3—200 H.P., West., 900 RPM, 440 V., 60 Cyc. Slip-Ring Motors.
3—75 H.P., G. E., 720 RPM, 440 V., 60 Cyc. Slip-Ring Motors.
1—200 H.P., 720 RPM, 440 V., 3 Phase, 60 Cyc., Allis-Chalmers, Slip-Ring Motor.
Variable speed control equipment for above.

Zimmerman Electric Machinery Co.
1815–17 East Central Wichita, Kansas

At Your Service . . .

The Searchlight Section is at your service for bringing business needs or "opportunities" to the attention of men associated in executive, management, sales and responsible technical, engineering and operating capacities with the industries served by McGraw-Hill publications.

"SEARCHLIGHT" Opportunity Advertising

—to help you get what you want.
—to help you sell what you no longer need.

Take advantage of it—For Every Business Want

"Think SEARCHLIGHT First"